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**SITE WORK PLAN
FORMER WEST PULLMAN WORKS SITE
1015 WEST 120th STREET
CHICAGO, ILLINOIS**

VOLUME I OF III

June 1996

Prepared for:

**Navistar International Transportation Corp.
Chicago, Illinois 60601**

Prepared by:

**Geraghty & Miller, Inc.
Chicago, Illinois**



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**SITE WORK PLAN
FORMER WEST PULLMAN WORKS SITE
1015 WEST 120TH STREET
CHICAGO, ILLINOIS**

EXECUTIVE SUMMARY

This Site Work Plan (Work Plan) was prepared on behalf of Navistar International Transportation Corp. (Navistar) for submission to the Illinois Environmental Protection Agency (IEPA) under the voluntary Site Remediation Program. The Better Living Foundation (current site owner) has given Navistar permission to enter this site into the Site Remediation Program. The Work Plan (Volume I) describes the activities that will be conducted and the procedures that will be followed to evaluate the environmental conditions at the Former West Pullman Works Site (previously known as the *International Harvester West Pullman Works*) located at 1015 West 120th Street in Chicago, Illinois. The Health and Safety Plan and Community Relations Plan associated with the work to be conducted at the Former West Pullman Works Site have been prepared as separate volumes of the Work Plan. The Health and Safety Plan is Volume II of the Work Plan and Community Relations Plan is Volume III of the Work Plan.

Navistar's goal for the site activities is to prepare the property for industrial redevelopment by others by addressing the environmental concerns at the Site. Navistar will not be participating in any industrial redevelopment activities at the site. Based upon available information, the environmental concerns at the site include the presence of asbestos-containing materials, contaminated soils, and underground storage tanks. The underground storage tanks (USTs) will initially be addressed in this Work Plan, but some or all of the USTs may be regulated by UST-specific environmental regulations and will be generally excluded from the Site Remediation Program as required by Section 58.1 (a)(2)(iii). However such excluded USTs may still be managed, to the extent allowed by federal law and regulation, utilizing the provisions of the site remediation program, including the procedures for establishing risk-based remediation objective, under section 58.5.



The overall approach to the site is first address the surficial (i.e., above the concrete floor) environmental concerns and the USTs, followed by an investigation of subsurface potential environmental concerns (i.e., below the concrete floor). An investigation will be performed to confirm the presence or absence of USTs suspected to be present. The next step will be to characterize materials for disposal including: the contents of the confirmed USTs, oil-contaminated wood block and associated surficial soils, asbestos-containing materials, smoke stack ash, and the (yellow-green) discolored surficial soils. After the completion of the disposal characterization, the USTs and the characterized materials will be removed and disposed of off-site at the appropriate facilities.

The purpose of the subsurface soil investigation is to determine if impacted soils are present beneath the concrete floor at the site. The investigation will also provide information to characterize the nature of geologic materials in the shallow subsurface. The subsurface investigation will include approximately 33 soil samples. The soil samples will be analyzed for parameters likely to be present including volatile organic compounds, polynuclear aromatic hydrocarbons, polychlorinated biphenyls, selected metals and cyanide. The results of the subsurface soil investigation will be presented in the Site Investigation Report.

Remediation Objectives will be developed using the "Tiered Approach to Cleanup Objectives" (TACO) Guidance Document (January 1996) prepared by the IEPA. Additional investigative activities beyond those described in this Work Plan may be conducted if supplemental information is required for the TACO evaluation. Based on the TACO evaluation, a Remediation Objectives Report will be prepared to present the risk-based (TACO) objectives to the IEPA.

A Remedial Action Plan will be prepared to describe the activities, controls, or measures to be taken, if needed, to meet the approved Remediation Objectives. The Remedial Action Plan will be implemented upon approval by the IEPA. Upon completion of the Remedial Action activities, a Remedial Action Completion Report will be prepared to document that Remediation Objectives were achieved in accordance with the Remedial Action Plan. After IEPA review and approval of the Remedial Action Report, the IEPA will issue a "No Further Remediation Letter".



**SITE WORK PLAN
FORMER WEST PULLMAN WORKS SITE
1015 WEST 120TH STREET
CHICAGO, ILLINOIS**

1.0 INTRODUCTION

1.1 AUTHORIZATION

This Site Investigation Work Plan (Work Plan) was prepared on behalf of Navistar International Transportation Corp. (Navistar) for submission to the Illinois Environmental Protection Agency (IEPA) under the voluntary Site Remediation Program. The Work Plan describes the activities that will be conducted and the procedures that will be followed to evaluate the environmental conditions at the Former West Pullman Works Site (previously known as the International Harvester West Pullman Works) located at 1015 West 120th Street, Chicago, Illinois.

The voluntary Site Remediation Program is governed by Title 17 of the Illinois Environmental Protection Act, which became effective on December 15, 1995, and replaces the voluntary Pre-Notice Program. Navistar is a previous owner of the Former West Pullman Works Site. The current owner, the Better Living Foundation (BLF), has given Navistar permission, in a letter dated March 11, 1996, to enter the Former West Pullman Works Site into the voluntary Site Remediation Program. Navistar submitted an application to the IEPA and the site was accepted into the voluntary Site Remediation Program on May 7, 1996.

1.2 PURPOSE AND SCOPE

Navistar's goal for the site activities is to prepare the property for industrial redevelopment by others by addressing the environmental concerns at the Site. Navistar will not be participating in any industrial redevelopment activities at the site. Based upon available information, the environmental concerns at the site include the presence of asbestos-containing materials, contaminated soils, and underground storage tanks. The underground storage tanks (USTs) will initially be addressed in this Work Plan, but some or all of the USTs may be regulated by UST-specific environmental regulations



and may be excluded from the Site Remediation Program as required by Section 58.1 (a)(2)(iii). However, such excluded USTs may still be managed, to the extent allowed by federal law and regulation, utilizing the provisions of the site remediation program, including the procedures for establishing risk-based remediation objectives under Section 58.5.

The overall approach to the site is to first address the surficial (i.e., above the concrete floor) environmental concerns and the USTs, followed by an investigation of subsurface potential environmental concerns (i.e., below the concrete floor). An investigation will be performed to confirm the presence or absence of USTs suspected to be present based upon review of available documents and interviews with former West Pullman Works employees. The next step will be to characterize materials for disposal including: the contents of the confirmed USTs, oil-contaminated wood block and associated surficial soils, asbestos-containing materials, smoke stack ash, and the (yellow-green) discolored surficial soils. After the completion of the disposal characterization, the USTs and the characterized materials will be removed and disposed of off-site at the appropriate facilities.

The purpose of the subsurface soil investigation is to determine if impacted soils are present beneath the concrete floor at the site. The investigation will also provide information to characterize the nature of geologic materials in the shallow subsurface. The results of the site investigation will be presented in the Site Investigation Report.

Remediation Objectives will be developed using the "Tiered Approach to Cleanup Objectives" (TACO) Guidance Document (January 1996) prepared by the IEPA. Additional investigative activities beyond those described in this Work Plan may be conducted if supplemental information is required for the TACO evaluation. Based on the TACO evaluation, a Remediation Objectives Report will be prepared to present the risk-based (TACO) objectives to the IEPA.

Subsequently, a Remedial Action Plan will be prepared to describe the activities, controls, or measures to be taken, if needed, to meet the approved Remediation Objectives. The Remedial Action Plan will be implemented upon approval by the IEPA. Upon completion of the Remedial Action



activities, a Remedial Action Completion Report will be prepared to document that Remediation Objectives were achieved in accordance with the Remedial Action Plan. After IEPA review and approval of the Remedial Action Report, the IEPA will issue a "No Further Remediation Letter".

1.3 ORGANIZATION OF THE WORK PLAN

This Work Plan is organized into five sections of text, plus references, tables, figures, and appendices. A brief description of each section follows.

Section 1.0, Introduction, presents the purpose and organization of the Site Work Plan, and presents the project team organization and responsibilities.

Section 2.0, Background, describes the current site conditions, presents information on the history of the site, and presents the results of prior investigations. This section also identifies the potential recognized environmental conditions.

Section 3.0, Site Activities, describes activities to be conducted, the rationale for sampling locations and analytical parameters, and the methodology to be used to conduct the site investigation.

Section 4.0, Quality Assurance, describes the quality assurance samples to be collected and refers the reader to Appendix C where variations from Appendix D are indicated. Appendix D contains the Pre-Notice Site Cleanup Program analytical quality assurance requirements.

Section 5.0, Schedule, provides the schedule for the work identified in Section 3.0 and report preparation and submittal activities.

Section 6.0, References, lists reports and guidance documents used in the development of this Site Work Plan.

Appendix A, Photographs, contains photographs from site visits by Geraghty & Miller referenced in Section 2.0 of this Work Plan.

Appendix B, Field Data Forms, provides examples of the forms to be used for collection of field data and documentation of field activities.

Appendix C, Site-Specific Quality Assurance Protocol, presents or references the procedures to be followed during the site investigation activities.



Appendix D, Analytical Quality Assurance Plan, provides a copy of the Analytical Quality Assurance Plan (AQAP) for the IEPA Bureau of Land Pre-Notice Site Cleanup Program. The AQAP presents the analytical quality assurance requirements of the Program.

The Health and Safety Plan and Community Relations Plan associated with the work to be conducted at the Former West Pullman Works Site have been prepared as separate volumes of the Work Plan. The Health and Safety Plan is Volume II of the Work Plan and Community Relations Plan is Volume III of the Work Plan.

1.4 PROJECT ORGANIZATION

There are a number of governmental agencies that have been involved with the Former West Pullman Works Site in the past, including the United States Environmental Protection Agency (U.S. EPA), the Illinois Environmental Protection Agency (IEPA) and the City of Chicago. Because the site has been accepted into the Illinois voluntary Site Remediation Program, the IEPA will have the lead responsibility for community relations and the oversight of the activities conducted at the Former West Pullman Site including the review and approval of reports and work plans, as shown on Figure 1-1. Other agencies will coordinate their interest through the IEPA. The reader is referred to the Community Relations Work Plan for additional details. The Better Living Foundation, the current site owner, will provide its input to the process through Navistar. Geraghty & Miller will be responsible for the development and implementation of the Work Plans under Navistar's direction, as approved by the IEPA, and will enlist the services of subcontractors, as needed. EnviroCom Incorporated, Geraghty & Miller's subcontractor, has been added to the project team to assist in the community relations area. Other subcontractors will be identified and selected as needed.



2.0 SITE BACKGROUND

This section of the report consists of a review of the site description and site history. The information presented in this section was obtained by Geraghty & Miller during the records review, visual site inspection, interviews with former employees, and from published information.

The records review consisted of a review of readily available site historical records, previous environmental reports, aerial photographs, fire insurance maps, and regional topographic and geologic maps. The information was reviewed to identify areas of potential impact from former site operations and raw material storage areas, and current site conditions. The visual site inspection consisted of a detailed walk-through of the property to assess the current condition of the property and identify recognized environmental conditions, such as distressed vegetation, stained soil or surface materials, free liquids, unauthorized dumping, or other visual indication of a release of a hazardous substance. The interviews with former employees of the Former West Pullman Works Site were conducted subsequent to the visual site inspection.

Mr. James Auer and Ms. Lynn Martyn of Geraghty & Miller's Chicago, Illinois office conducted the visual site inspection of the Former West Pullman Works Site on May 20, 1996. A follow-up visual site inspection was conducted by Mr. Auer on May 29, 1996. During the visual inspection of the Former West Pullman Works Site, Geraghty & Miller took a series of photographs that are provided in Appendix A. Notations will be made throughout the text of this report as to which photograph in Appendix A depicts the structure or specific land feature being discussed. Subsequent to the site inspection, Geraghty & Miller conducted interviews with Mr. Dave Montec, a retired Stationary Engineer at the Former West Pullman Works Site, and Mr. Jim Gats, a former Human Resources Department employee at the Former West Pullman Works Site.



2.1 SITE DESCRIPTION

This section provides a summary of the physical setting, site observations, surrounding land use, and regional geologic setting.

2.1.1 Physical Setting

The Former West Pullman Works Site is located at 1015 West 120th Street in the City of Chicago, Cook County, Illinois (Figure 2-1). Based on our site inspection and review of the United States Geological Survey (USGS) Blue Island, Illinois Quadrangle, 7.5 Minute Series topographic map, the general topography in the vicinity of the Former West Pullman Works Site is relatively flat at an elevation of approximately 610 feet above mean sea level (ft msl).

The Former West Pullman Works Site consists of an open, 21-acre parcel of land. The Former West Pullman Works Site was formerly the location of a manufacturing facility that supplied parts for tractors, trucks, farm implements, refrigerators, freezers, and industrial power products. The Former West Pullman Works was razed soon after the facility was closed in 1983, except for the smokestack associated with the boiler house that was demolished by the City of Chicago in May 1996. A general site layout is provided on Figure 2-2.

2.1.2 Site Observations

This section summarizes the observations made by Geraghty & Miller during the initial and follow-up site inspections. The discussion focuses on the current condition of the Former West Pullman Works Site and the potential recognized environmental conditions that were identified by Geraghty & Miller during the site inspections in concert with the historical records review. The location of the potential recognized environmental conditions identified by Geraghty & Miller are shown on Figure 2-3. The corresponding identifier letter used to depict the recognized environmental condition locations on Figure 2-3 is noted within the text.

The concrete floors of the former manufacturing buildings and vehicle access roadways were not removed as part of the site demolition. As a result, a significant portion of the Former West Pullman Works Site (approximately 90% or more) is covered by concrete or asphalt pavement. The concrete was in relatively good condition at the time of the site inspection with one notable area of observed concrete staining in the central portion of the site (Area A; Photo #1). Based on the historical records review, the stained concrete area was the site of a former painting operation building located in the central portion of the property.

As evidenced by observations made during the site inspection, portions of the former manufacturing building floors were covered by oil-soaked wood blocks and soil material (Area B; Photo #2). During the follow-up site inspection, Geraghty & Miller confirmed that these areas were underlain by concrete. There was approximately two to four inches of oil-soaked soil material overlying the concrete in the wood block floor areas. The oil-soaked wood blocks and soil material exhibited a noticeable petroleum-type odor during the site inspection. Another notable area of staining observed at the time of the site inspection was an area of yellowish-green stained soil located adjacent to a former plating building in the southeastern portion of the property (Area C; Photo #3). The yellowish-green stained soil was also underlain by concrete. Additionally, Geraghty & Miller observed isolated areas of 9-inch and 12-inch vinyl floor tile, a suspected asbestos containing material (ACM), on the former concrete floors along the central portion of the northern property boundary (Area D; Photo #4).

Geraghty & Miller also observed several areas of building ruins and demolition debris stockpiles at the Former West Pullman Works Site during the site inspection. The most notable building ruins and demolition debris stockpiles consist of the former boiler house buildings, cistern, and smokestack located in the northwestern portion of the property, a large demolition debris pile in the east-central portion of the property, and smaller debris piles along the eastern and southern property boundaries. The demolition debris stockpiles consisted mainly of concrete blocks, brick, concrete, metal reinforcement (rebar), and transite, a suspected ACM (Area E;



Photo #5). Geraghty & Miller also observed ash in the vicinity at the base of the former smokestack (Area F).

Two existing underground storage tank (UST) areas were observed at the Former West Pullman Works Site during the site inspection. Two USTs were observed in the northwestern portion of the property adjacent to the former boiler house (Area G) and eight USTs were observed in the southeastern portion of the property (Area H). Based on historical site drawings reviewed by Geraghty & Miller and conversations with Former West Pullman Works personnel, the two USTs located adjacent to the boiler house were constructed of steel with a capacity of 10,000 gallons and formerly used for fuel oil storage (Photo #6). Mr. Montec recalled that these two fuel oil USTs were filled with water prior to the closure of the facility. The eight USTs located in the southeastern corner of the property were all constructed of steel with a capacity of 15,400 gallons each (Photo #7). According to historical site drawings, the eight 15,400-gallon USTs were formerly used for the storage of oleum spirits (2), cutting oil (2), lube oil (1), and used oil (1). Two of the eight USTs were indicated as being empty on the site drawing reviewed by Geraghty & Miller.

Geraghty & Miller also observed evidence of two aboveground storage tank areas at the Former West Pullman Works Site during the site inspection. The first AST area consisted of an existing open-top, steel mixing tank observed along the southern property boundary within a concrete containment area, the base of which was approximately 8 feet below the level of the former concrete floor (Photo #8). Evidence of a second former AST, in the form of three concrete saddles, was observed immediately north of the steel mixing tank (Photo #9). Geraghty & Miller also observed a brick-constructed rectangular containment structure with two inner sections, which was filled with rainwater, located immediately north of the three concrete saddles (Photo #10).

Based on our review of historical site drawings and interviews with Former West Pullman Works personnel, these structures were part of the former wire pickling system (Area I). The



concrete saddles formerly supported a sulfuric acid AST, which was the primary chemical used in the steel wire pickling process. The brick-constructed containment structure was the former pickling dip tank. The steel wire was dipped into a solution of sulfuric acid and water in the brick containment structure. The open-top steel tank was part of the sulfuric acid regeneration process where iron was removed from the sulfuric acid such that it could be reused.

Geraghty & Miller also observed several open manholes and pipes emanating from the subsurface at the property during the site inspection. Based on visual observations made during the site inspection and review of a municipal sewer map, Geraghty & Miller determined that most of the open manholes observed at Former West Pullman Works Site at the time of the site inspection were part of the combined sanitary and storm water sewer system that formerly served the manufacturing facility. The manhole and combined sewer line locations are shown on Figure 2-2. Geraghty & Miller noted three manholes of particular concern; two manholes were observed which contained water with a visual sheen (Areas J and N) and one was observed which contained oil (Area K) at the time of the site inspection. The manhole that contained oil was located near a former waste process water UST that was shown on a historical site drawing reviewed by Geraghty & Miller. A Former West Pullman Works employee also indicated that oil-soaked metal chips generated from the various manufacturing processes that formerly took place at the Former West Pullman Works Site were stored in the general vicinity of the oil-filled manhole. Most of the other manholes observed during the site inspection contained water, but no visual evidence of any oily material was present.

Geraghty & Miller also observed a subsurface utility tunnel which contained piping for steam lines used for heating and hot water. The utility tunnel started at the former boiler house buildings located in the northwestern portion of the property and extend eastward across the property with extensions to the southern portions of the property.

Manholes and piping observed during the site inspection which did not appear to be associated with the sewer system or utility tunnel were determined to be suspected UST areas



with a notable exception. A former building foundation located near the east-central property line contained a total of six manholes and manways which contained oil at the time of the site inspection (Area L; Photo #11). Based on the historical records review, it was determined that the concrete foundation was the former oil cooler building. According to a Former West Pullman Works employee, the oil cooler building was used to cool the oil contained in the quench oil basins, which may be in the basement of the oil cooler building, utilized as part of the former heat treating operations. The suspected UST areas consist of the following:

- Three 4-inch pipe openings and a subsurface pipe with a bolted-on cap located immediately east of the former boiler house buildings (Area M; Photos #12 and #13);
- Unidentified manhole adjacent to manhole containing oil located in central portion of property (Area K; Photo #14);
- Unidentified manhole and rectangular openings with a former building located in the central portion of the southern property boundary (Area N; Photo #15); and,
- A 6-inch pipe emanating from the ground adjacent to a stained gravel surface along the railroad siding on the southern property boundary (Area O; Photo #16).

A historical site drawing indicated that three USTs were formerly located where Geraghty & Miller observed the three rectangular openings noted above (Area N). The site drawing indicated that the USTs consisted of three 12,000-gallon tanks that formerly contained lube oil, quench oil, and mineral seal oil.

The historical site drawing reviewed by Geraghty & Miller also showed the presence of four other UST areas that were not previously noted. The first UST area consisted of two 15,000-gallon USTs located at the center of the southern property boundary beneath a former manufacturing building concrete floor (Area P). According to the drawing, the two 15,000-gallon USTs formerly contained quench oil and lube oil, respectively. The second UST area consisted of two 15,000-gallon lube oil USTs located beneath a former manufacturing building concrete floor in the central portion of the property, immediately east of the boiler house area (Area Q). The third UST area consisted of two 350-gallon gasoline USTs located adjacent to the scale house on



the northern property boundary (Area R). According to a Former West Pullman Works employee, a gasoline pump was located at the southwest corner of the scale house building. The fourth UST area consisted of five USTs that formerly contained fuel oil (4) and oleum (1) and located immediately west of the eight existing USTs (Area S). The eight USTs (Area H) replaced the five USTs when Building 48 was constructed in 1948. According to a historical site drawing, the five USTs were abandoned in-place. No visual evidence of any of these four UST areas was observed by Geraghty & Miller at the time of the site inspection.

No other notable structures or land features that appeared to represent a potential recognized environmental condition were observed by Geraghty & Miller during the site inspection.

2.1.3 Regional Geological Setting

According to regional geologic information, the shallow surficial soils at the Former West Pullman Works Site consist of glacial soils deposited during the Woodfordian-Twocreekan-Valderan Substage of the Wisconsin glacialiation (Willman 1971). The shallow glacial soils at the Former West Pullman Works Site are part of an area mapped as Lake Plain. (Willman 1971). Lake Plain consists of the floors of glacial lakes flattened by wave erosion and by minor deposition in low areas. Lake Plain is largely underlain by glacial till with local deposits of silt, clay, and sand of the Equality Formation.

The bedrock below the surficial deposits is the Niagaran Series Racine Dolomite. In the vicinity of the Former West Pullman Works Site, the bedrock surface is at approximately 550 ft msl (Willman 1971) and the land surface elevation is at approximately 610 ft msl. Therefore, the estimated depth to bedrock at the Former West Pullman Works Site is 60 feet below land surface (ft bls). The glacial till overlying the bedrock consists primarily of relatively impermeable clay.

The nearest surface water to the subject property is the Little Calumet River, which is located approximately 1 mile south of the Former West Pullman Works Site. Due to the presence

of the Little Calumet River, it is believed that the shallow groundwater flow direction in the vicinity of the Former West Pullman Works Site is towards the south. It is believed that the shallow groundwater table is encountered between 10 and 15 ft bls.

2.1.4 Surrounding Land Use

The surrounding land use section identifies the current use of the properties located adjacent to the Former West Pullman Works Site and discusses the results of a regulatory agency database review.

Adjacent Properties

The Former West Pullman Works Site is located in the Victory Heights District of the City of Chicago. Victory Heights is part of the 34th Ward and located in the far southernmost section of the city. The Former West Pullman Works Site is currently zoned for industrial use ("M"). The site is located in a mixed industrial and residential section of the city. The properties surrounding the Former West Pullman Works Site consist of active industrial properties, former industrial properties, residential properties, an elementary school, and an Illinois Central Gulf Railroad (ICG) right-of-way and passenger station.

The Former West Pullman Works Site is immediately bounded to the north by Ingersoll Steel Works, an active steel works facility, and the West Pullman Iron and Metal Company, a scrap dealer. The Former West Pullman Works Site is immediately bounded to the south by an ICG right-of-way and passenger station. The West Pullman Branch Elementary School and a residential neighborhood are located south of the western half of the Former West Pullman Works Site beyond the ICG right-of-way. A manufacturing facility is located south of the eastern half of the Former West Pullman Works Site on the opposite side of the ICG right-of-way.

The Former West Pullman Works Site is immediately bounded to the west by an open lot which was formerly the site of an industrial facility. The Former West Pullman Works Site is



immediately bounded to the east by the Former Dutch Boy Paints manufacturing facility. At the time of the site inspection, the City of Chicago was in the process of demolishing and clearing the Former Dutch Boy Paints site.

Regulatory Agency Database Review

The review of federal and state regulatory agency databases identifies those sites that use, store, treat, generate, dispose of, or otherwise handle hazardous materials. Geraghty & Miller subcontracted the task of performing a review of available environmental regulatory agency databases to Environmental Data Resources (EDR) of Bridgeport, Connecticut. On May 13, 1996, EDR completed a review of federal and state regulatory agency databases for the Former West Pullman Works Site.

Specific search radii used for each individual federal and state agency database was determined based upon the ASTM Standard for Phase I Environmental Site Assessments (ASTM E-1527-94). The following paragraphs provide brief summaries of the federal and state regulatory agency databases that were reviewed. The EDR report also includes an orphan site listing for sites with partial address information. Any orphan site that appears to be located within the prescribed ASTM search radius for an individual database has been included in the database listing summaries that are presented below.

USEPA National Priorities List (NPL)

The NPL is the USEPA list of uncontrolled hazardous substance facilities that need to be addressed under the Superfund program. The NPL includes sites that are shown to have hazardous material contamination and are scheduled for cleanup. A review of the NPL database revealed no sites in the vicinity of the Former West Pullman Works Site.

USEPA CERCLIS Database

The Comprehensive Environmental Response Compensation and Liability Information System (CERCLIS) database is the comprehensive database and management system of the USEPA that inventories and tracks releases addressed, or needing to be addressed, by the Superfund program. The database includes "inactive releases" (those where a determination has been made, based on available information, that no further action is needed) and "active releases" (those that have not been looked at yet or where it has been determined that further action is necessary). A review of the CERCLIS database identified two sites, the Former West Pullman Works Site and the Former Dutch Boy Paints site, the property located immediately east of the subject property.

A review of the CERCLIS reports prepared for USEPA Region V is provided in the *Previous Environmental Reports* section of this report. The Former Dutch Boy Paints site was listed on the CERCLIS No Further Remedial Action Planned (CERCLIS-NFRAP) database. CERCLIS-NFRAP sites are sites where no contamination was found, contamination was removed quickly without the need for the site to be placed on the NPL, or the contamination was not serious enough to require federal action or NPL consideration following an initial investigation.

A Unilateral Administrative Order was issued by the U.S. EPA on March 26, 1996 to NL Industries to require NL Industries to investigate lead contamination of on-site and off-site soils, develop a plan to reduce the risks associated with the lead impacts, and implement the U.S. EPA-approved alternative to abate the hazards associated with lead contaminated on-site and off-site soils.

USEPA Resource Conservation and Recovery Act (RCRA)

The RCRA database is a compilation by the USEPA of reporting facilities that generate, store, transport, treat, or dispose of hazardous waste, including treatment, storage, and disposal



(TSD) facilities, large quantity generators, and small quantity generator sites. In addition to performing a review of the RCRA database, Geraghty & Miller also ordered a review of the RCRA Administration Action Tracking System (RAATS) database and Corrective Action Report (CORRACTS) database to identify RCRA sites where enforcement action or violations have been noted and corrective action activities have been initiated. A review of the RCRA database identified eight large quantity generator sites, four small quantity generator sites, and no TSD sites.

The Former West Pullman Works Site was identified as a RCRA large quantity generator. According to the EDR report, the types of hazardous wastes generated at the Former West Pullman Works Site consisted of flammable waste (D001), corrosive waste (D002), spent pickle liquor (K062), lead (D008), plating waste (F009), and sodium cyanide (P106).

The remaining seven RCRA large quantity generators that were identified in the regulatory agency database review consist of:

- Ingersoll Steel at 1000 West 120th Street, located immediately north of the Former West Pullman Works Site;
- Dutch Boy, Inc. at 12842 South Peoria Street, located immediately east of the Former West Pullman Works Site;
- Calumet Heat Treating Corporation at 12139 South Peoria Street, located immediately south of the Former West Pullman Works Site;
- Heat Treating Corporation of America at 1120 West 119th Street, located approximately $\frac{1}{8}$ mile to the north;
- W.E. Davis Company at 1220 West 119th Street, located approximately $\frac{1}{8}$ mile to the north;
- Abbey Metal Corporation at 814 West 120th Street, located approximately $\frac{1}{4}$ mile to the east; and,
- E.J. Brownlee Transportation, Inc. at 1001 West 115th Street, located between $\frac{1}{2}$ and 1 mile to the north.



The four RCRA small quantity generator sites identified in the regulatory agency database review report consist of:

- Big Mels Cleaners at 12256 South Halsted Street, located approximately $\frac{1}{2}$ mile to the southeast;
- Village of Calumet Park at 12409 South Throop Street, located $\frac{1}{2}$ to 1 mile to the southwest;
- Cedar Park Cemetery at 12540 South Halsted Street, located $\frac{1}{2}$ to 1 mile to the southeast; and,
- Chicago Housing Authority at 833 West 115th Street, located approximately 1 mile to the northeast.

None of the identified RCRA generator sites appeared on the RAATS or CORRACTS databases indicating that no enforcement actions or violations have been brought against any of the sites.

USEPA Emergency Response Notification System Database (ERNS)

The ERNS database contains spills records and stores information on reported releases of oil and hazardous substances. A review of the ERNS database revealed no sites.

State Hazardous Waste Sites (SHWS)

The SHWS database records are the State of Illinois' equivalent to CERCLIS. These sites may or may not already be listed on the federal CERCLIS list. Priority sites planned for cleanup using state funds are identified along with sites where cleanup will be paid for by potentially responsible parties. No SHWS database sites were identified within a 1-mile radius of the Former West Pullman Works Site. It should be noted that the orphan site listing provided in the EDR report included two sites identified as Dutch Boy Paints. No address information was provided for the two Dutch Boy Paints SHWS database listings. As a result, Geraghty & Miller could not



determine whether the Dutch Boy Paints SHWS database listings referred to the Former Dutch Boy Paints property located immediately east of the Former West Pullman Works Site.

Solid Waste Facilities Landfill Sites (SWF/LS)

The SWF/LS database records contain an inventory of solid waste disposal facilities or landfills in a particular state. Depending on the state, these may be active or inactive facilities or open drums that failed to meet RCRA Section 2004 criteria for solid waste landfills or disposal sites. A review of the SWF/LS database revealed no sites.

Registered USTs

USTs are regulated under RCRA and must be registered with the state department responsible for administering the UST program. The EDR review of the registered UST database identified six sites within $\frac{1}{2}$ mile of the Former West Pullman Works Site. The registered UST sites identified in the database report include the following:

- Central States Pipe & Supply, Inc. at 12101 South Peoria Street, located approximately $\frac{1}{8}$ mile to the southwest; and,
- Gas City at 11959 South Halsted Street, located approximately $\frac{1}{4}$ mile to the east-northeast.
- Village of Calumet Park at 12409 South Throop Street, located approximately $\frac{1}{2}$ mile to the southwest;
- Cedar Park Cemetery at 12540 South Halsted Street, located approximately $\frac{1}{2}$ mile to the southeast; and,
- Phillips 66 at 12535 South Halsted Street, located approximately $\frac{1}{2}$ mile to the southeast (two listings).



LUST Database

The LUST database contains an inventory of all reported leak incidents. The EDR review of the LUST database identified three sites within $\frac{1}{2}$ mile of the Former West Pullman Works Site and include the following:

- Village of Calumet Park at 12409 South Throop Street, located approximately $\frac{1}{2}$ mile to the southwest;
- Cedar Park Cemetery at 12540 South Halsted Street, located approximately $\frac{1}{2}$ mile to the southeast; and,
- Phillips 66 (George Franklin) at 12535 South Halsted Street, located approximately $\frac{1}{2}$ mile to the southeast.

Based on the fact that the identified LUST sites are located $\frac{1}{2}$ mile southwest and southeast of the Former West Pullman Works Site and the shallow regional groundwater direction is believed to be towards the south-southeast, the identified LUST sites are located downgradient of the Former West Pullman Works Site and have not likely impacted the Former West Pullman Works Site.

2.2 SITE HISTORY

This section of the report consists of a brief summary of the history of the Former West Pullman Works Site, including a review of Sanborn fire insurance maps, historical aerial photographs, and previous environmental reports. Information presented in this section was obtained from the interviews with Former West Pullman Works personnel, historical site records, and public information sources.



2.2.1 Former Site Operations

The Former West Pullman Works Site dates back to 1893 at its 120th Street location. Prior to 1902, the Former West Pullman Works Site was known as the Plano Manufacturing Company, which was one of five original concerns to join in the formation of IH in 1902. In 1902, products manufactured at the Former West Pullman Works Site included lever binders, chains, mowers, and hay rakes.

During the height of its operations, the Former West Pullman Works Site manufactured parts from which tractors were made, including bolts, nuts, rivets, bearings, battery ignition units, carburetors, magnetos, and screw machine parts. In addition, the Former West Pullman Works Site manufactured bolts, nuts, rivets, cotter pins, cap screws, ball and roller bearings, screw machine parts, and forgings for motor trucks; chain, bolts, nuts, bearings, and magnetos for farm implements; bolts, nuts, and screw machine parts for refrigerators and freezers; and, anti-friction bearings, carburetors, magnetos, bolts, and nuts for industrial power products. The former manufacturing processes utilized consisted of painting, forging, punching, woodworking, machining, heat treating, and on-site power generation. The types of potentially hazardous substances formerly used at the Former West Pullman Works Site consisted primarily of solvents, oils, fuels, acids, and ACM.

Based on conversations with Former West Pullman Works employees, three notable former manufacturing processes consist of heat treating, bolt and nut manufacturing, and ball bearing manufacturing. Heat treating consisted of dipping heated forged parts into quench oil. Heat treating was performed in the former manufacturing buildings located along the eastern property boundary and the two westernmost buildings along the southern property boundary (bolt and nut and ball bearing manufacturing buildings). The oil cooler building was used to cool the quench oil in the eastern manufacturing building.



The bolt and nut manufacturing operation formerly used a pickling process, which was described previously, and a cutting and lubrication oil collection pit for the recirculation of oils through the manufacturing process (Area T). It has also been reported that there may have been a zinc-plating line in the bolt and nut department, but the exact location is not known. The ball bearing manufacturing department utilized a chip conveyor system located beneath the floor level for the collection of metal chips from the various cutting, punching, and grinding operations formerly utilized to produce ball bearings (Area U). The metal chips were soaked with cutting and lubrication oils which were separated from the chips in a centrifuge such that the chips could be sold as scrap.

In 1983, the facility was closed and sold to the West Pullman Associates. West Pullman Associates sold the equipment and inventory and then sold the buildings and land to a church group known as the Better Living Foundation. The buildings were demolished and removed from the site over the next two years by the Better Living Foundation's demolition contractor. The only exception was the smokestack associated with the former boiler house buildings which was razed by the City of Chicago in May 1996. During the site inspection, Geraghty & Miller observed several areas of building ruins and demolition debris stockpiles.

2.2.2 Sanborn Map Review

In order to obtain historical information related to the Former West Pullman Works Site, Geraghty & Miller obtained a series of Sanborn fire insurance maps from Sanborn Mapping & Geographic Information Services, Inc. of Pelham, New York. Sanborn maps provide information on commercial and industrial property use to the fire insurance industry and indicate the building construction and design, types of manufacturing processes housed in the facility, and presence of flammable material storage and process operations. A search of available map coverage was conducted for the Former West Pullman Works Site and maps were available for the years 1911, 1939, 1950, 1975, 1987, and 1993. The following sections briefly summarize each of the Sanborn maps that were obtained for the Former West Pullman Works Site.



1911 Map

The 1911 map depicts the International Harvester Company Plano Division manufacturing facility occupying the subject property, the Chicago Malleable Castings Company to the west of the subject property, the Carter White Lead Company to the east of the subject property, and railroad tracks to the south of the subject property. Four branching railroad spurs are evident throughout the Former West Pullman Works Site. The west end of the Former West Pullman Works Site is occupied by large stock sheds. Dry kilns and a lumber shed are depicted immediately to the east of the stock sheds along the southern property boundary. The area north of the dry kilns and east of the stock sheds depicts the location of a proposed power plant and reservoir. The boiler house buildings and cistern would subsequently be constructed at the proposed power plant and reservoir locations.

The map depicts warehouses and storage buildings in the center of the Former West Pullman Works Site. A manufacturing building used for the production of steel wheels and gears is located along the central portion of the southern property boundary. The printing buildings, engine room, coal shed, fire protection water reservoir, and forge shop are located east of the central warehouse and storage buildings.

Woodworking, printing, and machine shop operations are located in the northeastern corner of the Former West Pullman Works Site. Foundry operations, including a core oven and coke bin, are located in the manufacturing building located along the eastern property boundary. Storage buildings for iron, wood, and steel, along with additional kilns, are located to the west of the foundry building.

1939 Map

Changes are evident at the Former West Pullman Works Site when comparing the 1911 and 1939 Sanborn maps. The 1939 map indicates that the property is referred to as the International Harvester Company West Pullman Works. The large storage sheds evident along

the western property boundary of the Former West Pullman Works Site in the 1911 map were replaced by a parking lot, traveling crane, and concrete reservoir (cistern). The engine and boiler rooms are evident immediately to the east of the cistern.

The central warehouse and storage buildings are still evident in the central portion of the Former West Pullman Works Site on the 1939 map. The former steel wheel and gear manufacturing building is described as a bolt shop on the 1939 map. A dispensary and laboratory building is depicted between the factory buildings to the east and central warehouses near the north-central portion of the Former West Pullman Works Site.

Factory buildings, heat treating areas, and a forge shop occupy the majority of the eastern portion of the Former West Pullman Works Site. A pickling shed is depicted immediately along the west wall of the forge shop. A pump house is evident near the center of the eastern portion of the property which is the current location of concrete foundation where Geraghty & Miller observed several manways containing oil during the site inspection. Facility drawings refer to this building as the oil cooler building. A copper plating operation is noted to the south of the pump house in the southeastern portion of the site. The location of the copper plating operation is where Geraghty & Miller observed yellowish-green stained soil at the time of the site inspection. An oil storage building with three fuel oil USTs located beneath the building and two fuel oil USTs located adjacent to the building were evident in the southeastern corner of the Former West Pullman Works Site.

Surrounding properties depicted on the 1939 map include the Ingersoll Steel Disc Division and Neuswanger Coal Company to the north and the National Lead Company to the east.

1950 and 1975 Maps

Several notable changes to the Former West Pullman Works Site appeared to occur related to the expansion of the facilities since the 1939 map was created. The map reveals that the bolt shop at the southern property boundary was expanded and a heat treating area was added.



Several of the central warehouse and storage building were converted into machine shop areas. A ball bearing factory building was constructed in the parking lot located at the southwest corner of the Former West Pullman Works Site in 1945. Three fuel oil USTs were evident in the northeast corner of the ball bearing factory building (Area V). No signs of evidence of these USTs were observed by Geraghty & Miller during the site inspection. Administrative offices were indicated in the western half of the factory building located along the central portion of the northern property boundary.

The southeastern corner of the Former West Pullman Works Site appeared to undergo a change in the period of years between 1939 and 1950. A new steel storage building was constructed where the oil storage building and five USTs were evident on the 1939 map. The oil storage building and five USTs are not depicted on the 1950 map. The oil storage area appeared to be relocated into the building located immediately east of the new steel storage building on the 1950 map. According to facility drawings, the USTs were abandoned in-place and replaced with four new USTs located east of the new steel storage building. Geraghty & Miller observed the four newer fuel oil USTs at the time of the site inspection, but, as mentioned previously, no visual evidence of the five original USTs was observed during the site inspection. The 1950 map also showed a sulfuric acid AST on concrete supports located inside of the new steel storage building. Geraghty & Miller observed the concrete AST supports (saddles) during the site inspection.

There did not appear to be any significant changes to the 1975 map for the Former West Pullman Works Site in comparison to the 1950 map. The only apparent change appeared to be an oil filter storage area in the ball bearing factory building located at the southwestern corner of the property. It should be noted that the two existing UST areas, the two USTs located north of the boiler house buildings in the northwestern corner of the property and the four USTs located in the southwestern corner of the property, observed during the site inspection were not depicted on the 1975 map, which is the last map showing the Former West Pullman Works Site as a manufacturing facility.



Surrounding properties depicted on the 1950 map include the Ingersoll Steel Disc Division and Neuswanger Coal Company to the north and the National Lead Company to the east. In 1975, the West Pullman Iron and Metal Company occupied the property formerly held by the Neuswanger Coal Company.

1987 and 1993 Maps

The 1987 and 1993 maps depict the Former West Pullman Works Site as a vacant parcel of land, which is consistent with the fact that the virtually all of the facility building were razed and the site cleared from 1983 to 1985. The National Lead Company (Former Dutch Boy Paints) site is also shown as vacant land with the exception of an area of concrete ruins depicted on the 1993 map. The Ingersoll Steel Disc Division and West Pullman Iron and Metal Company appear similar in appearance in the 1987 and 1993 maps as they appeared in the 1975 map.

2.2.3 Aerial Photograph Review

Eight aerial photographs were obtained to depict the visual history of the Former West Pullman Works Site from Geonex Chicago Aerial Survey of Des Plaines, Illinois. Aerial photographs are from 1949, 1958, 1960, 1970, 1975, 1985, 1990, and 1995. The following sections provide brief summaries of the specific land features evident in the aerial photographs that were obtained for review.

The 1949 photograph shows the Former West Pullman Works Site as a manufacturing facility. Most of the buildings formerly located at the Former West Pullman Works Site had already been constructed when the 1949 photograph was taken and occupy almost the entire property except for the northwestern corner adjacent to the boiler house and cistern. A noticeable feature of the boiler house area is a large coal storage pile located immediately north of the cistern where the two fuel oil USTs were observed during the site inspection. The new steel storage building, located in the southeastern corner of the property, was under construction in the 1949 aerial photograph. The location of the four fuel oil USTs which replaced the five USTs

associated with the former oil storage building, formerly located where the new steel storage building was being constructed, was evident on the 1949 photograph.

Surrounding properties in the 1949 photograph consisted of industrial properties to the north, south, east, and west. The Ingersoll Steel Disc Division and the Neuswanger Coal Company were evident to the north; Calumet Heat Treating Corporation was evident south of the eastern half of the property; National Lead Company (Former Dutch Boy Paints) was evident to the east; and the marble casting company manufacturing facility was evident to the west. The adjacent property south of the western half of the Former West Pullman Works Site consisted of vacant property at the time of the 1949 photograph.

The 1958 photograph showed that the steel storage building under construction in the 1949 photograph was completed. Additionally, a small shed-type building was constructed at the northwestern corner of the property sometime between 1949 and 1958. Steel is apparently being stored in the open areas between the buildings in the southeastern portion of the property. No significant differences were evident in the 1958 photograph of the Former West Pullman Works Site. The only evident change in the 1958 photograph with respect to adjacent properties occurred to the south of the Former West Pullman Works Site. An additional industrial building was evident south of the eastern half of the property and single-family residences were constructed on a portion of the vacant property to the south.

The next aerial photograph that was reviewed was taken in 1960. The only evident change between the 1958 and 1960 photographs was related to the industrial area located south of the eastern half of the Former West Pullman Works Site. Another industrial building was constructed between 1958 and 1960.

The next aerial photograph that was reviewed was taken in 1970. Sometime between 1960 and 1970, a building or overhang was constructed over the former driveways extending from the central portion of the western property boundary eastward to the approximate center of

the Former West Pullman Works Site. This building is located immediately between the ball bearing building located at the southwestern corner of the property and the boiler house area (i.e., buildings and cistern). The coal storage area located immediately north of the cistern appears to be in the process of being phased out at the time of the 1970 photograph. It does not appear that any stockpiled coal material is evident in the coal storage area, but the ground surface appears to be stained black, likely from residual coal material on the surface. The only evident change related to the adjacent properties evident in the 1970 photograph was the continued expansion of the industrial property located south of the eastern half of the property.

The next aerial photograph that was reviewed was taken in 1975. The only evident change in the 1975 with respect to the Former West Pullman Works Site is related to the coal storage area located immediately north of the cistern. The coal storage area or black stained surface is not evident in the 1975 photograph. The former location of the coal storage area appears to have been paved over with concrete sometime between 1970 and 1975. The only evident change related to the adjacent properties concerned the properties located south of the Former West Pullman Works Site. One of the buildings associated with the industrial property south of the eastern half of the site was razed sometime between 1970 and 1975. Additionally, the elementary school located south of the Former West Pullman Works Site was constructed sometime between 1970 and 1975.

The next photograph that was reviewed was taken in 1985. A significant amount of change has occurred at the Former West Pullman Works Site since 1975. Except for some isolated buildings, the Former West Pullman Works manufacturing facility has been razed and the property is covered with demolition debris where the buildings formerly stood. The only buildings evident in the 1985 photograph are the two boiler house buildings, cistern, and smokestack, a portion of the steel storage building, the building immediately west of the steel storage building, and portions of buildings located at the northeast corner of the property. The observations made in the 1985 photograph are consistent with historical records that stated that the facility was closed in 1983 and demolished soon thereafter. The industrial property located



immediately west of the Former West Pullman Works Site was demolished in the period of years between 1975 and 1985, and the Former Dutch Boy Paints site to the east was apparently undergoing demolition in the 1985 photograph. No buildings are evident on the western adjacent property while several buildings are still evident at the Former Dutch Boy Paints site in the 1985 photograph. No significant changes to the northern and southern adjacent properties were evident in the 1985 photograph.

The final two aerial photographs that were obtained for review were taken in 1990 and 1995. Both depict the Former West Pullman Works Site much as it appeared at the time of the site inspection. The only noticeable difference is that the smokestack was evident in both the 1990 and 1995 photographs and was razed in May 1996 by the City of Chicago prior to the site inspection. The only evident difference with respect to the adjacent properties at the time of the site inspection and the 1990 and 1995 photographs is related to the Former Dutch Boy Paints site located immediately east of the Former West Pullman Works Site. The Former Dutch Boy Paints site was undergoing demolition by the City of Chicago at the time of the site inspection whereas the 1990 and 1995 photographs show a single multiple-story building located on the eastern boundary of the Former Dutch Boy Paints property.

2.2.4 Previous Environmental Reports

As part of the historical file review, Geraghty & Miller reviewed previous reports on environmental related activities that took place at the Former West Pullman Works Site in the past. The most noteworthy environmental activities that previously occurred at the Former West Pullman Works Site were the performance of two separate Site Assessments by Ecology & Environment, Inc. (E&E), on behalf of USEPA Region V. The first Site Assessment was conducted by E&E on August 17, 1993, the results of which are summarized in the October 7, 1993 Site Assessment Report for the International Harvester Site prepared by E&E. The second Site Assessment was conducted by E&E on June 1, 1995, the results of which are summarized in the August 18, 1995 Site Assessment Report for the International Harvester/Dutch Boy Site Part

1 of 2 prepared by E&E. The second part of the report discusses the relevant findings for the Dutch Boy Paints site located immediately east of the Former West Pullman Works Site. The information provided in the following paragraphs has been paraphrased from the E&E Site Assessment Reports.

The 1993 E&E Site Assessment was performed to evaluate the potential threat to human health and the environment at the Former West Pullman Works Site. The 1993 Site Assessment report refers to three previous environmental investigations conducted at the Former West Pullman Works Site by either the USEPA or IEPA. In August 1987, the USEPA technical assistance team conducted a Site Assessment at the Former West Pullman Works Site and found concentrations of PCBs at concentrations of less than 50 parts per million (ppm) in soil samples collected at the property. In August 1988, the IEPA conducted a Screening Site Inspection (SSI) of the Former West Pullman Works Site and found "low" concentrations of polychlorinated aromatic hydrocarbons (PAHs or PNAs) and asbestos in soil samples collected at the property. In June 1991, the USEPA Field Investigation Team conducted an off-site reconnaissance inspection of the Former West Pullman Works Site and documented hydrologic surface and groundwater data and found demolition debris at the site. The 1993 Site Assessment of the Former West Pullman Works Site was conducted to confirm the previous findings.

During its visual site inspection, E&E noted that all the buildings had been demolished with the exception of the smokestack and a building (boiler house) located adjacent to it. E&E noted that a majority of the Former West Pullman Works Site was covered by concrete with open manholes leading to the combined municipal sewer system. Demolition debris piles that were 10 to 15 feet high were observed by E&E at several locations. E&E collected four grab samples of suspected ACM; a grab water sample from the containment area surrounding the steel mixing tank (L-1); a grab water sample and duplicate from the pit containing the four existing USTs at the southeastern corner of the property (L-2 and L-3); and a soil sample from an oil-stained area (former wood block floor area) near the east-central portion of the site.



One of the four samples of suspected ACM was found to contain asbestos. The ACM was identified as transite and contained 40% chrysotile. The transite was collected by E&E from a demolition debris pile located in the southeastern corner of the property. Geraghty & Miller observed transite mixed with demolition debris in several piles located on the eastern-third of the Former West Pullman Works Site.

The three water samples were analyzed for volatile organic compounds (VOCs) using USEPA Method 8240 and PAHs using USEPA Method 8310.

The following is a summary of the grab water sample analytical results:

Constituent	L-1 (mg/L)	L-2 (mg/L)	L-3 (mg/L)
Acetone	0.048	0.770	1.0
2-Butanone		0.170	0.320
4-Methyl-2-Pentanone			0.012
2-Hexanone			0.021
Naphthalene	0.013		0.090
Acenaphthene		0.170	0.140
Phenanthrene			0.032
Anthracene			0.029
Fluoranthene		0.037	0.055
Pyrene		0.091	0.150
Chrysene		0.037	0.059

The USEPA concluded that the constituent concentrations detected in the grab water samples did not constitute a threat to human health or the environment.

The surface soil sample collected by E&E at the Former West Pullman Works Site was submitted to an outside laboratory for an analysis of PAHs by USEPA Method 8310 and Toxicity Characteristic Leachate Procedure (TCLP) Resource Conservation Recovery Act (RCRA) metals using USEPA Method 7471 and 6010. According to the Site Assessment Report, no significant concentrations of TCLP metals were found in the soil sample that was collected. PAHs were



found at elevated concentrations within the oil-stained soil area. The following is a summary of the detectable PAH concentrations:

Constituent	Soil Sample S-1 (mg/kg)
Naphthalene	110
Acenaphthene	340
Pyrene	190
Benzo(a)anthracene	78
Chrysene	270
Benzo(b)fluoranthene	140

E&E concluded that the ACM and PAH-contaminated soil present at the Former West Pullman Works Site represent a potential health risk. In addition, the presence of open manholes and other physical hazards present a potential risk due to inadequate site security. E&E recommended that the ACM and PAH-contaminated soil be collected and disposed of in accordance with applicable federal, state, and local regulations. Further, E&E recommended that additional sampling be conducted at the Former West Pullman Works Site to delineate the nature and extent of any contamination that may exist due to the size of the Former West Pullman Works Site. E&E recommended that test cores through the concrete be completed and the underlying soil be sampled for an analysis of VOCs and PAHs.

The 1995 E&E Site Assessment was performed to evaluate the potential threat to human health and the environment at the Former West Pullman Works Site by compiling background information, performing soil sampling, and documenting on-site activities. During the site assessment, E&E met with members of the Community Economic Revitalization (CER) group to discuss the concerns of nearby residents that rain is washing contaminants from the Former West Pullman Works Site to the nearby residential properties and elementary school property. CER expressed concern related to several stained areas, the open pits filled with water, the open-top steel mixing tank and related containment area, and several open manholes. The CER specifically noted an area of stained soil along the railroad tracks along the western half of the southern property boundary which was observed by Geraghty & Miller and noted to be a suspected UST



area. The CER stated that the stained area fills with water during precipitation events, but did not overflow onto the nearby residential properties. E&E concluded the stormwater runoff did not migrate off-site to the south as noted in previous inspection reports prepared by the City of Chicago and State of Illinois.

Surface soil samples were collected during the 1995 Site Assessment to determine whether impact to the nearby residential property has occurred. Two soil samples were collected from the elementary school property (S-1 and S-2); one from a residential property (S-3); one from the west end of the Former West Pullman Works Site (S-4); and, one at the north-central boundary of the Former West Pullman Works Site (S-5). The surface soil samples were submitted to an outside laboratory for an analysis of VOCs using USEPA 8260, semivolatile organic compounds (SVOCs) using USEPA Method 8270, organochlorine pesticides using USEPA Method 8081, PCBs using USEPA Method 8081, total and reactive cyanide and sulfide using USEPA Methods 9010 and 9030, priority pollutant metals using USEPA Method 3051 and 6010, and total petroleum oil using USEPA Method 418.1. Soil sample S-1 was also analyzed for oil and grease using USEPA Method 413.1.

Detectable concentrations of SVOCs and priority pollutant metals were the only constituents found in the five soil samples. No detectable concentrations of VOCs, pesticides, PCBs, cyanide, sulfide, total petroleum oil, and oil and grease were found. According to the 1995 Site Assessment Report, the sampling did not indicate the presence of an imminent and substantial threat to human health or the environment. E&E concluded that the analytical results from the 1995 Site Assessment showed that off-site contaminant migration has not occurred in the areas that were sampled even though previous site investigations have demonstrated that the Former West Pullman Works Site poses a threat to human health and the environment.



2.2.5 Potential Recognized Environmental Conditions

Based on the visual site inspection, interviews with Former West Pullman Works employees, and reviews of Sanborn fire insurance maps, aerial photographs, and historical site drawings, Geraghty & Miller has identified several potential recognized environmental conditions at the Former West Pullman Works Site. As discussed previously, the potential recognized environmental conditions identified by Geraghty & Miller are shown on Figure 2-3. The following is a summary of the potential recognized environmental conditions identified at the Former West Pullman Works Site:

- Black-stained concrete at the former location of Building 24 in the central portion of the site where a painting operation was formerly housed (Area A);
- Oil-soaked wood blocks and soil material at various locations in the eastern third of the site, in particular along the northern and eastern property boundaries (Area B);
- Yellowish-green stained soil material located adjacent to the former copper plating building (Area C);
- Suspected ACM vinyl floor tile on the former concrete building floors along the central portion of the northern property boundary (Area D);
- Transite asbestos material mixed in amongst the demolition debris stockpiles located in the eastern third of the site (Area E);
- Smokestack ash observed at the base of the former smokestack in the northwestern portion of the property (Area F);
- Two 10,000-gallon fuel oil USTs located immediately north of the cistern that were observed at the Former West Pullman Works Site at the time of the site inspection (Area G);
- Eight 15,400-gallon USTs located in the southeastern corner of the property that formerly contained oleum, cutting oil, lube oil, and used oil that were observed at the Former West Pullman Works Site at the time of the site inspection (Area H);

- Location of sulfuric acid AST, where three concrete saddles that formerly supported the tank were observed, pickling dip tanks, and open-top mixing tank, which was formerly associated with the acid regeneration process (Area I);
- Manhole contained water with a visible sheen located at the southeast corner of Building 19 near the central portion of the northern property boundary (Area J);
- Manhole containing oil and a suspected waste process water UST located at the southeastern corner of Building 47 in the central portion of the site (Area K);
- Presence of oil beneath the former concrete floor of the oil cooler building in a suspected basement located along the central portion of the eastern property boundary (Area L);
- Three 4-inch pipe openings and subsurface pipe with a bolted-on cap located immediately east of the former boiler house buildings representing a suspected UST (Area M);
- Three suspected 12,000-gallon USTs that formerly contained lube oil, quench oil, and mineral seal oil located beneath the concrete floor in the southeast corner of Building 45 where three rectangular openings were observed during the site inspection along with a manhole with a sheen on the water inside (Area N);
- A 6-inch pipe emanating from the ground representing a suspected UST located adjacent to a stained gravel surface area along the railroad siding near the southwestern corner of the property (Area O);
- Two suspected 15,000-gallon UST that formerly contained lube oil and quench oil located beneath the floor of Building 46 at the central portion of the southern property boundary (Area P);
- Two suspected 15,000-gallon lube oil USTs located beneath the concrete floor of Building 47 in the central portion of the property, approximately 100 feet east of the boiler house area (Area Q);
- Two suspected 350-gallon gasoline USTs located adjacent to the guard house along the northern property boundary (Area R);
- Five suspected USTs that formerly contained fuel oil and oleum which were reportedly abandoned in-place beneath the present location of the Building 48, immediately west of the eight existing USTs (Area S);
- Suspected oil collection pits beneath the concrete floor surface of Building 46 where the bolt and nut manufacturing operations were formerly located (Area T);

- Suspected metal chip collection system beneath the concrete floor surface of Building 45 where the ball bearing manufacturing operations were formerly located (Area U); and,
- Three suspected 12,000-gallon fuel oil USTs located in the northeastern corner of Building 45 as indicated on the Sanborn fire insurance maps (Area V).

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3.0 SITE ACTIVITIES

Section 2 of this Work Plan provides a summary of the available historical information and identifies a number of areas of potential environmental concern. The areas of potential environmental concern can be grouped into three major categories: Surficial Issues, USTs and Subsurface Structures, and Subsurface Issues. The Site Activities are divided into five major Tasks based upon these groupings:

- Task 1 - UST/Subsurface Structure/ Surficial Material Management
- Task 2 - Subsurface Investigation
- Task 3 - Site Investigation Report
- Task 4 - Remediation Objectives Report
- Task 5 - Remedial Action

Each of these Tasks include a number of subtasks as described below.

3.1 USTs, SUBSURFACE STRUCTURES AND SURFICIAL MATERIALS

Task 1 UST/Subsurface Structure/Surficial Material Management

The USTs, other subsurface structures containing oil and surficial materials are grouped together because the surficial materials, the contents of the subsurface structures and the USTs and their contents will be removed from the site and disposed of at an approved facility. Therefore, the site activities will focus on the collection of samples to characterize these wastes for disposal. Once the wastes are characterized and approved for disposal at an off-site facility, the wastes and the USTs can be removed.



Task 1.1 UST Verification

There are two areas where USTs are known to be present and no additional field verification is needed. These are the two 10,000-gallon fuel oil USTs located at Area G immediately north of the cistern and eight 15,400-gallon USTs located at Area H at the southeast corner of the property. Based on field observations and site background data, it is suspected that USTs are located in Areas K, M, N, O, P, Q, R, S, and V as identified on Figure 2-3. (also see Table 3-1). To confirm the presence or absence of suspected USTs, a backhoe will be used to excavate in the vicinity of features (i.e., fill ports or vent pipes) indicating the presence of a UST.

If it is confirmed that a UST is present, the tank will be removed under Task 1.5 in accordance with applicable UST regulations. If a release is confirmed during tank removal activities, the UST will be managed under the Leaking Underground Storage Tank (LUST) Program. In preparation for removal activities, a sample will be collected of the tank contents, if any are present, for waste characterization analyses as described under Task 1.2.

If a UST is not present, the nature of the subsurface structure, if any, will be determined to the extent feasible. During excavation activities, soil will be screened with a PID to determine if the soil is impacted by volatile organic compounds (VOCs). Field screening with the PID will be performed in accordance with the procedures outlined in Section 3.2. If impacts are indicated and the subsurface structure is not a UST, an impacted soil sample will be collected for laboratory analysis. The appropriate target analytes will be determined in the field based on the nature of the subsurface structure. It is anticipated that the soil sample will be analyzed for VOCs and PAHs. The soil sample will be collected from the backhoe bucket.

Stained surficial soil was observed near the area where a UST is suspected to be present along the southern property boundary (Area O on Figure 3-1). During excavation activities to determine the presence or absence of the suspected UST at Area O, a soil sample will be collected

from within the stained area for laboratory analysis. In addition, the volume of stained soil will be estimated based on the depth of the visible staining and the area of surficial staining.

Task 1.2 UST Contents Sampling

The analytical requirements for disposal will be determined based on visual inspection of the tank contents and available information on past use of the UST. The number of waste streams will be minimized by grouping compatible waste and preparing composite samples for disposal approvals requests. Each composite sample of the liquid contents will likely be analyzed for total arsenic, cadmium, chromium, lead, PCBs, flash point, chlorine, and bottom sediment and water (BS&W).

Task 1.3 Sampling of Subsurface Structures Containing Oil

There are three manholes on-site where either a sheen or oil-type substance was observed in the manhole (Areas J, K, and N on Figure 2-3). In addition, an oil-type substance was observed in the subsurface structures associated with the Oil Cooler Building (Area L on Figure 2-3). To obtain an initial assessment of the quantity of oil-type substances present in these subsurface structures, the thickness of the substance will be measured using an oil/water interface probe. In addition, the dimensions (including depths) of the subsurface structures will be measured, where possible. The diameters of the pipes connected to the sewer manholes will be determined by measuring the depth to the invert and depth to the crown of the pipe. In addition, the materials of construction for the sewer manholes, pipes, and subsurface structures associated with the Oil Cooler Building will be documented based upon visual observations from the surface.

Other manholes and catch basins at the site will be inspected to determine the presence or absence of a sheen or oil. If oil is observed in any of the additional manholes or catch basins, the thickness of the oil and dimensions of the subsurface structure will be determined as described above.

Upon completion of inspection, a composite sample of the oily liquid present in each of the manholes will be prepared, and a sample of the oil present in the subsurface structures associated with the Oil Cooler Building will be collected. These samples will be analyzed for the following waste characterization parameters:

- TCLP metals
- TCLP organics (VOCs and SVOCs only)
- Sulfide
- Cyanide
- Total phenol
- Flashpoint
- pH
- PCBs

Task 1.4 Wood Block, Ash, Debris, and Surficial Soil Sampling

An asbestos survey will be conducted to identify suspected ACM. Suspected ACM will be analyzed to confirm the presence or absence of asbestos. Based upon available data, suspected ACM present at the site includes transite panels (Area E) and floor tiles (Area D).

Samples will be collected of the following additional materials for disposal characterization:

- Smokestack ash (Area F)
- Stained wood block flooring (Area B)
- Stained soil in areas with wood block flooring (Area B)
- Yellowish green stained soil (Area C)

These four samples will be analyzed for the following parameters to characterize the materials for off-site disposal:

- pH
- Flash point
- Percent solids
- Paint filter
- Bulk density
- Total and reactive cyanides
- Total and reactive sulfides
- Total phenol
- Extractable organic halogen (EOX)
- TCLP metals
- TCLP organics (VOCs and SVOCs only)

In addition, the wood block flooring and stained soil in areas with wood block flooring will be analyzed for PCBs.

Task 1.5 Waste Removal/UST Removal

There are existing and suspected USTs present at the site that have been out of service for greater than one year. Based on a review of historical information and the Leaking Underground Storage Tank (LUST) database, the USTs are not registered, and there are no known releases from the USTs. Because the USTs are no longer in use, the tanks will be emptied and removed in accordance with applicable UST regulations, including registration and removal permits from the Fire Marshall. If a release is confirmed during tank removal activities, the release will be reported to the Illinois Emergency Management Agency (IEMA), as required. Investigation and corrective action activities will be conducted under the Illinois LUST Program in accordance with the applicable LUST regulations.



Upon approval granting acceptance of the liquid waste by a disposal facility, the oily liquid in the sewer manholes and subsurface structures associated with the Oil Cooler Building will be pumped out by an oil recovery service. During pumping of the sewer manholes, connected manholes and catch basins will be visually inspected from the surface to evaluate the potential conduits and sources of the oily substances. Upon completion of pumping, the manholes will be inspected to determine if oily substances return to the manholes.

Subsequent to the UST removals, the other waste materials and impacted surficial soils will be removed and disposed of off-site at an appropriate facility.

Task 2 Subsurface Investigation

Table 3-1 identifies the areas that the available data indicates that there is the potential for subsurface soil contamination. The suspected zinc-plating line has not been included at this time because the location has not been confirmed. The areas identified on Table 3-1 are A, B, C, I, J, K, L, N, T and U (Figure 2-3). Soil samples will be collected to determine if soil contamination is present as described below for each area. Additional sampling may be needed at a later date to determine the extent of contamination detected under this task.

Table 3-2 is a summary of the subsurface investigation program. The location, number of investigative, and the field and laboratory parameters are included in this table. The target compounds for each analyte group (i.e., VOCs, PAHs, PCBs, etc.) are identified in Table 3-4. Collection of quality assurance samples and data quality levels are addressed in Section 4.0. Field activities will be conducted in accordance with the Health and Safety Plan (Volume II of the Work Plan).

Task 2.1 Areas J, K, L, and N Sewer Manholes and Other Subsurface Structures

A total of six soil borings (WPSB-1 through WPSB-6) will be advanced adjacent to sewer manholes or other subsurface structures where a sheen or oil-type substance was observed because the integrity of the subsurface structures is unknown. One soil boring will be advanced adjacent to the sewer manholes located in the following areas:

- Area J (near southeast corner of former Building 19) (WPSB-1)
- Area K (near southeast corner of former Building 47) (WPSB-2)
- Area N (near southeast corner of former Building 45) (WPSB-3)
- Area L (perimeter of the former Oil Cooler Building) (WPSB-4 to WPSB-6)

The soil boring location identification is provided in parentheses above (e.g., WPSB-1, etc.). The above soil borings will be advanced to the depth of the bottom of the sewer/ subsurface structure, or to the water table at an estimated depth of 10 to 15 feet below land surface (ft bls), whichever is deeper. Soil samples will be collected continuously during advancement of the borings. The specific procedures for soil sample collection are described in Section 3.2. Soil samples will be screened in the field for volatile organic compounds (VOCs) using a photoionization detector (PID) as described in Section 3.2.

One soil sample per boring, collected from the interval in the unsaturated zone exhibiting the highest PID reading, will be analyzed for VOCs, polynuclear aromatic hydrocarbons (PAHs), and polychlorinated biphenyls (PCBs). If PID readings are at background levels throughout the borehole, the sample interval directly above the water table or the sample interval adjacent to the depth of the bottom of the subsurface structure, whichever is shallower, will be analyzed for VOCs, PAHs, and PCBs to assess the potential for groundwater impacts. The selection of target analytes is based on the presence of unknown oil-type substances in the subsurface structures. VOCs and PAHs are typically present in oil products. PCBs, which are associated with some oils,

were selected as a target analyte because the type of oil present in the subsurface structures is unknown.

Task 2.2 Area B Wood Block Floor Areas

Surficial soil staining was observed on the eastern one-third of the site in areas where oil-stained wood block flooring is present (Areas designated B on Figure 3-1). Twelve soil borings (WPSB-7 through WPSB-18) will be advanced in the areas of oil-stained soil and wood block flooring. The approximate locations of the soil borings are shown in Figure 3-1. The exact locations of the borings will be determined in the field based on the presence of staining. The borings will be advanced in areas exhibiting obvious visible staining. The specific procedures for soil sample collection are described in Section 3.2. Soil samples will be screened in the field for volatile organic compounds (VOCs) using a photoionization detector (PID) as described in Section 3.2.

One soil sample per boring will be collected for laboratory analysis. The sample will be collected from a depth of 0.5 to 1 ft below the concrete floor. The soil samples will be analyzed for VOCs, PAHs, and extractable semi-volatile compounds (SVOC's), and PCBs. The selection of target analytes is based on the presence of oil staining observed on the wood block flooring and surficial soils. VOCs and PAHs are typically present in oil products. Acid extractable SVOCs, such as cresols, may be associated with the wood block, if the wood block was preserved with cresote. PCBs, which are associated with some oils, were selected as a target analyte because the type of oil present is unknown.

Task 2.3 Area C Former Copper Plating Area

A yellowish green- stained soil was observed adjacent to Former Copper Plating Building (Area C on Figure 3-1). One soil boring (WPSB-19) will be advanced in the area where green surficial staining was observed. The approximate location of Soil Boring WPSB-19 is shown on

Figure 3-1. The specific procedures for soil sample collection are described in Section 3.2. One soil sample will be collected from a depth of 0.5 to 1 ft below the concrete floor for laboratory analysis. The soil sample will be analyzed for total cyanide and total metals including cadmium, chromium (total and hexavalent), lead, nickel, and copper.

The samples will also be analyzed for the above metals using the Toxicity Characteristic Leaching Procedure (TCLP) to assess the potential for metals to leach to groundwater. In addition, the soil sample will be analyzed for pH so that total levels of metals may be used to evaluate the migration to groundwater exposure route using the TACO guidance, if appropriate. Metals and cyanide were selected as the target analyte because these parameters are associated with plating and the yellowish green-staining appears to indicate potential impact by historical plating operations conducted in the Former Copper Plating Building.

Task 2.4 Area I Former Sulfuric Acid Aboveground Storage Tank

One soil boring (WPSB-20) will be advanced in the vicinity of the former sulfuric acid AST. The approximate boring location is shown on Figure 3-1. The exact location will be determined in the field based on the condition of the concrete still present in the former AST area. The soil boring will be completed in an area of the concrete exhibiting cracking or evidence of corrosion, if existent. The boring will be advanced through the concrete pad to a depth of approximately 1 ft into the native soil below the concrete. The specific procedures for soil sample collection are described in Section 3.2. One soil sample, collected from a depth of approximately 0.5 to 1 ft below the bottom of the concrete floor, will be analyzed for pH to assess whether the soil below the concrete has been impacted by the sulfuric acid AST.

Task 2.5 Area I Former Pickling Operations

Soil boring (WPSB-21 to 27) will be advanced in the area where the former pickling operations took place. The approximate locations of the soil borings are shown on Figure 3-1.

The specific procedures for soil sample collection are described in Section 3.2. One soil sample will be collected from a depth of 0.5 to 1 ft below the concrete floor for laboratory analysis. The soil sample will be analyzed for total metals including cadmium, chromium (total and hexavalent), lead, nickel, and copper.

The samples will also be analyzed for the above metals using the Toxicity Characteristic Leaching Procedure (TCLP) to assess the potential for metals to leach to groundwater. In addition, the soil sample will be analyzed for pH so that total levels of metals may be used to evaluate the migration to groundwater exposure route using the TACO guidance, if appropriate. Metals were selected as the target analyte because certain metals are associated pickling operations.

Task 2.6 Area A Black Stained Concrete

Two soil borings (WPSB-28 through WPSB-29) will be completed in the area of black-stained concrete flooring remaining at Building No. 24. The approximate locations of the soil borings are shown on Figure 3-1. The exact locations will be determined in the field based on the condition of the stained concrete. The soil borings will be completed in areas of the stained concrete exhibiting cracking or along the expansion joints in the concrete.

The specific procedures for soil sample collection are described in Section 3.2. Soil samples will be screened in the field for volatile organic compounds (VOCs) using a photoionization detector (PID) as described in Section 3.2.

One soil sample per boring, collected from 0.5 to 1.0 ft below the bottom of the concrete floor, and will be analyzed for VOCs, PAHs, TCLP lead, and total lead. The selection of target analytes was based on potential historical operations (former paint spray booths). Cleaning solvents, oils, and paint could potentially be associated with the operations. VOCs are typically found in cleaning solvents, paints, and oils, PAHs are typically associated with oils, and lead may

have been present in the paints used in the paint shop. The soil samples will be analyzed for TCLP lead to assess the potential for lead to leach to groundwater. The total concentration of lead in soil is required to develop risk-based remedial objectives for the ingestion and inhalation pathways to be considered as part of the TACO evaluation.

Task 2.7 Oil Collection Pits/Metal Chips System

A trenching investigation will be performed to determine the location of the oil collection pits and the metal chips system. Two soil samples will be collected from the backhoe bucket in each area to determine if the soils are impacted. The samples will be analyzed for VOCs, PAHs and PCBs because of the potential presence of oil in these areas.

Task 2.8 Soil Properties

Additional soil samples will be collected to obtain site-specific physical soil parameters for the TACO evaluation. Five soil borings will be completed to collect soil samples to be submitted for laboratory testing of soil bulk density (ASTM D2937), soil particle density (ASTM D854), moisture content (ASTM D4959-89), organic carbon content (ASTM D2974-87), and hydraulic conductivity (ASTM D5084). The locations of the soil borings for physical parameters will be determined in the field based on the geology encountered during completion of Soil Borings WPSB-1 through WPSB-29. The soil borings for physical parameters will be advanced adjacent to previously completed soil borings where the geology encountered is representative of overall site conditions.

Two soil samples per boring will be collected if the predominant soil type in the unsaturated zone is different from the predominant soil type in the saturated zone. If the soil type is the same for both zones, only one representative sample from the unsaturated zone will be collected from each boring. Hollow stem auger drilling techniques will be used to drill to the

depth of sample collection. The samples will be collected using thin-walled tube samplers (Shelby tubes) in accordance with ASTM D1587-83 (Appendix A).

Task 3 Site Investigation Report

A report will be prepared in draft and final form summarizing the results of the site investigation. Three copies of the draft and final reports will be submitted to the IEPA. The final report will be prepared addressing the IEPA's comments.

Task 4 Remediation Objectives Report

The results of the subsurface investigation will be evaluated using the TACO process. A Remediation Objectives report will be prepared summarizing the TACO evaluation and recommending Remediation Objectives. Three copies of the draft and final reports will be submitted to the IEPA. The final report will be prepared addressing the IEPA's comments.

Task 5 Remedial Action

If Remedial Action is needed to meet the Remediation Objectives, a Remedial Action Plan will be developed designing the activities needed to meet the Remediation Objectives. Three copies of the draft and final plans will be submitted to the IEPA. The final plan will be prepared addressing the IEPA's comments. The IEPA-approved Remedial Action will be implemented according to the Remedial Action Work Plan. A Remedial Action Report will be prepared documenting the implementation of the Remedial Action Work Plan. Three copies of the draft and final reports will be submitted to the IEPA. The final report will be prepared addressing the IEPA's comments. Upon approval of the Remedial Action report, the IEPA will issue the "No Further Remediation Letter".



3.2 SAMPLING PROCEDURES

The procedures for waste liquid sampling, oil/water interface probe, hand auger and split-spoon soil sampling, field screening using the PID, chain-of-custody, documentation, decontamination, and disposal of investigation-derived materials are provided below.

3.2.1 Split-Spoon and Hand Auger Soil Sampling

The concrete will be cored at the designated sample location and a soil sample collected with a hand auger or a split-spoon sampler. Upon completion of drilling at each borehole, the boreholes will be backfilled with cuttings or bentonite chips. The concrete will be patched in locations where samples were collected beneath the concrete. Each soil sample will be described in the field by Geraghty & Miller personnel. The description will include color, moisture, range of particle sizes, consistency, structure, angularity and shape of coarser grains, and odor, if any. The soil samples will be classified in the field in accordance with American Society of Testing Materials (ASTM) standard D2488. A sample/core log will be completed by the field geologist and will include sample type, sample recovery, sample depth, time of sample collection, soil sample descriptions, PID readings, depth to water, and blow counts (as applicable). An example sample/core log is provided in Appendix B.

If VOC analysis is to be performed on a selected soil sample, the container designated for volatile analysis will be filled immediately to minimize volatilization. The other sample containers may then be filled. Sample containers will be labeled with the sample location and depth prior to filling. All samples subject to laboratory analysis will be placed on ice in the cooler. If field screening for VOCs is to be performed, a portion of the soil sample will be retained in a plastic bag or glass sample jar. The head space of the plastic bag or sample jar will be monitored for total organic vapors using a PID. Refer to Section 3.2. for additional information regarding field screening procedures. The soil sample description and other pertinent information will be



recorded on the sample/core log. The soil sampling equipment will be decontaminated as described in Section 3.2.

3.2.2 Waste Liquid Sampling/Oil Interface Probe

An oil/water interface probe will be used to determine the presence and thickness of oil layers in the liquid. The oil/water interface probe or other device may be used to estimate the dimensions of the subsurface structure. After the measurements are taken, a bailer or other device will be used to collect liquid samples from the UST, manhole and other structures. The bailer will be cleaned between uses or a disposable bailer will be used for each sample location. The bailer will be carefully lowered into the liquid and partially submerged. The partially full bailer will be brought to the surface and the liquid inspected for an oil layer or sheen while in the bailer and then after the bailer is emptied into a bucket. The bailer will then be again lowered into the liquid and fully submerged. The liquid will again be observed at the surface to determine if an oil layer is present and if the character of the liquid varies with depth. A sample will be prepared from the collected liquids for laboratory analysis.

3.2.3 PID Field Analysis

In locations where there is potential for VOC impacts, the soil samples will be screened in the field with a PID. The PID will be equipped with a 10.2 electron volt (eV) or 10.6 eV light source. Prior to use, the PID will be calibrated at least daily with 100 parts per million (ppm) isobutylene or other appropriate calibration gas in accordance with the manufacturer's recommended calibration procedures.

The following procedures will be followed for field screening of soil samples:

1. Samples will be placed in glass sample jars or sealable plastic bags so that the jar or bag is approximately one-third full. The jar or plastic bag will be labeled with the sample location and depth.



2. If a glass jar is used, the jar will be capped with aluminum foil and the jar lid. If a plastic bag is used, the bag will be sealed.
3. Approximately 10 minutes will be allowed for the liberation of soil vapors into the headspace of the jar or plastic bag.
4. The aluminum foil or plastic bag will be punctured with the monitor probe and headspace gases will be drawn through the PID unit.
5. The maximum response observed on the PID will be recorded on the sample/core log.
6. The instrument will be allowed to return to zero prior to taking a measurement on the next sample.

3.2.4 Decontamination

The drill rods, augers, samplers, tools, drill rig, and any piece of equipment that comes in contact with the formation will be hot-water pressure washed or cleaned with a non-sudsing detergent prior to beginning drilling at the site. The same cleaning protocols will be followed before leaving the site at the end of the project. In addition, all downhole drilling equipment will be cleaned prior to drilling at each boring location to prevent cross-contamination between boreholes. All on-site cleaning activities will be monitored by the field personnel.

Equipment used to collect the soil samples (e.g. split-barrel samplers, stainless steel spatulas) will be cleaned prior to collecting each sample. The procedure for cleaning this equipment will be as follows:

1. Prepare a solution of laboratory-grade detergent and potable water in a bucket.
2. Disassemble the sampler (if applicable) and immerse all parts in the laboratory-grade detergent solution.
3. Scrub equipment in the bucket with a brush to remove any adhering particles.
4. Rinse equipment with copious amounts of potable water.
5. Reassemble the cleaned sampler (if applicable).



3.2.5 Disposal of Investigation-Derived Materials

During the course of the soil sampling activities, the following investigative-derived materials will be generated:

- Disposable personal protective clothing.
- Drill cuttings.
- Water used for decontamination of samplers and other equipment at the site.
- Disposable equipment

Personnel protective clothing and disposable equipment will be collected in containers and stored on-site until proper disposal can be arranged. Soil cuttings not returned to the borehole and fluids generated during decontamination will be contained or stockpiled (soils only) until proper disposal can be arranged.

3.2.6 Surveying

The soil boring locations will be surveyed relative to a United States Geological Survey (USGS) standard benchmark. Vertical and horizontal control will be established by an Illinois licensed surveyor. Elevations will be surveyed to the nearest 0.1 ft relative to mean sea level (msl) and horizontal locations will be determined to the nearest foot.

3.3 FIELD LOGBOOKS/DOCUMENTATION

Field logbooks will provide the means of recording data collection activities. Entries will be described in as much detail as possible so that persons going to the site may reconstruct a particular situation without significant reliance on memory.

Each logbook will be identified by a project-specific number.

The title page of each logbook will contain the following.

- Person to whom the logbook is assigned
- Address and phone number of the Geraghty & Miller office conducting the work
- Project name
- Project start date

Entries into the logbook will contain a variety of information. At the beginning of each entry, the date, start time, weather, names of project team members and subcontractors present, level of personal protection being used, and the signature of the person making the entry will be entered. The names of visitors to the site, and the purpose of their visit will also be recorded in the field logbook.

Measurements made and samples collected will be recorded. All entries will be made in ink (weather permitting) and no erasures will be made. If an incorrect entry is made, the information will be crossed out with a single strike mark. Whenever a sample is collected, or a measurement is made, a detailed description of the location of the sampling or measurement point shall be recorded. All equipment used to make measurements will be identified, along with the date and time of calibration (if any required).

The equipment used to collect samples, the volume and number of sample containers, the decontamination procedures, and the quantity of investigation-derived wastes will be recorded in the logbook or other field record.

3.4 SAMPLE CUSTODY, CONTAINERS, PRESERVATION, AND HOLDING TIMES

Sample custody procedures and information regarding the appropriate sample containers, preservation, and holding times for each analyte group are provided in the sections below.

3.4.1 Sample Custody

The primary purpose of sample custody procedures is to create a written record that documents the possession of a sample from the moment of collection through analysis. The resulting information aids in data interpretation and serves as legal evidence of sample handling.

All samples will remain in the custody of sampling personnel from the time of collection until transfer to a representative of the courier service for delivery to the laboratory or shipment of the samples via overnight carrier. Stringent chain-of-custody procedures will be followed to document sample possession. An example chain-of-custody record is provided in Appendix B. The sample packaging and shipment procedures summarized below should insure that the samples will arrive at the laboratory with the chain-of-custody intact.

The following protocol will be used in the field:

- The field sampler is personally responsible for the care and custody of the samples until they are properly transferred. As few people as possible should handle the samples.
- All sample containers will be labeled with sample numbers and locations, date and time of collection, and type of analysis.
- The project manager will review documentation to determine whether proper custody procedures were followed during the field work and decide if additional samples are required.

The following procedures will be used when transferring custody of samples:

- The Chain-of-Custody Record will be placed inside the shipping container in a sealed plastic bag. The sample numbers and locations, the date and time sampled, number and description of sample containers, analyses required, project number/location, laboratory, and sampler(s) will be listed on the chain-of-custody form. When transferring the possession of samples, the individuals relinquishing and receiving will sign, date, and note the time on the record. This record documents custody transfer of

samples from the sampler to another person, to the laboratory, or to from a secure storage area.

- Samples requiring refrigeration will be promptly chilled with ice to a temperature of 4°C. Samples will then be properly packaged for shipment, and dispatched to the appropriate laboratory for analysis, with a separate signed custody record enclosed in each cooler. Shipping containers will be secured with strapping tape and custody seals for shipment to the laboratory. The preferred procedure includes use of a custody seal attached to the front right and back left of the cooler. The custody seals are covered with clear plastic tape. The cooler is strapped shut with strapping tape in at least two locations.
- If the samples are sent by common carrier, a bill of lading should be used. Receipts of bills of lading will be retained as part of the permanent documentation. Commercial carriers are not required to sign off on the custody form as long as the custody forms are sealed inside the sample cooler and the custody seals remain intact.

As required in the Analytical Quality Assurance Plan for the IEPA Bureau of Land Pre-Notice Site Cleanup Program (AQAP) (Appendix D), the project laboratory has custody procedures for sample receiving and log-in, sample storage, tracking during sample preparation and analysis, and storage of data which would allow the laboratory to demonstrate that sample and data custody was maintained.

3.4.2 Sample Containers, Preservation, and Holding Times

The appropriate sample containers, preservation methods, and holding times for each analyte group are presented in Table 3-3. The analytical laboratory will supply appropriate pre-cleaned containers for sample collection. The field personnel are responsible for properly collecting, labeling, and preserving the samples, as necessary.



4.0 QUALITY ASSURANCE

This section of the Work Plan provides information on the procedures to be followed to assure the quality of analytical data generated during the site investigation activities. The section below describes the quality assurance samples to be analyzed.

4.1 LEVEL OF QUALITY CONTROL EFFORT

Equipment blanks, trip blanks, and matrix spike samples will be analyzed to assess the quality of the data resulting from the field sampling and analytical programs. These samples will not be required for the waste characterization samples. Equipment blanks (water rinsate from clean equipment) are analyzed to check for procedural contamination at the site, which may cause sample contamination. Trip blanks (VOCs only) are used to assess the potential for contamination of samples during shipment and storage. Matrix spike samples provide information about the effect of the sample matrix on the digestion and measurement methodology. All matrix spikes are performed in duplicate and are hereinafter referred to as MS/MSD samples.

The level of quality control (QC) effort will be one MS/MSD for every 10 or fewer investigative soil samples and one equipment blank for every 10 or fewer investigative soil samples. One trip blank, consisting of distilled, deionized water, will be included with each shipment of samples to be analyzed for VOCs. Duplicate soil samples will not be collected due to the non-homogeneous nature of the samples and the high degree of variability routinely seen with the results from duplicate soil samples.

The level of QC effort provided by the laboratory will be equivalent to the level of QC effort specified in Section 7.0 of the AQAP (Appendix D). The project laboratory will meet the QC limits specified in this section of the AQAP.



4.2 IEPA ANALYTICAL QUALITY ASSURANCE PLAN

To the extent possible, the data quality objectives and analytical quality assurance requirements identified in the AQAP (Appendix D) will be met by the project laboratory. Samples collected during the site investigation activities will be analyzed by National Environmental Testing, Inc. (NET), Bartlett, Illinois. Site-specific quality assurance protocols are identified in Appendix C.

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5.0 SCHEDULE

Figure 5-1 presents the project schedule for Tasks 1, 2 and 3 and Work Plan Approval by the IEPA. Task 1 is allotted approximately three quarters to allow for sufficient time to complete the iterative process of locating USTs, characterizing their contents, obtain the needed approvals to remove the UST and to ship the waste off-site, and to remove the USTs and surficial impacted soils and materials, weather permitting. Task 2 follows the Task 1 activities maximum use can be made of information in Task 2. Task 4 and 5 are not included in the schedule as yet because it is too early to project those tasks.

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6.0 REFERENCES

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TABLES



TABLES



Table 3-1. Summary of Potential Recognized Environmental Conditions, Former West Pullman Works Site, Chicago, Illinois.

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Area Designation	Environmental Issue	Approximate Location	Task No.
A	Black-stained concrete	Former Building 24	2
B	Oil-soaked wood blocks	Various location	1,2
C	and associated soil Yellowish-green	on eastern third of site Former Building 1-Former	1,2
D	stained soil Suspected ACM	Copper Plating Building Central portion of site	1
E	Vinyl Floor Tile Transite ACM	along northern boundary Within demolition debris	1
F	Smokestack Ash	piles on eastern third of site At base of former smokestack	1
G	2-10,000 gallon fuel oil UST's	on northwestern portion of property Immediately north of cistern	1
H	8-15,400 gallon USTs	Southeastern corner of property	1
I	containing oleum, cutting oil, lube oil and used oil Former Pickling Area-Former	Former Building 14 and 48	1,2
J	Sulfuric AST, pickling dip tanks and open-topped mixing tank Sheen on water in a manhole	Southeast corner of former Building 19	1,2



Table 3-1. Summary of Potential Recognized Environmental Conditions, Former West Pullman Works Site, Chicago, Illinois.

Page 2 of 3

Area Designation	Environmental Issue	Approximate Location	Task No.
K	Oil in manhole and suspected waste	Southeast corner of Building 47	1,2
L	process water UST Oil present in a suspected basement to the former oil cooler building	Central portions of former Building 1	1,2
M	Suspected UST	Immediately east of former boiler house Building 27A	1
N	Three suspected USTs that formerly contained lube oil, quench oil and mineral seal oil. Manhole with sheen on water	Southeast corner of former Building 45	1,2
O	Suspected UST	South of southeast corner of former Building 45	1
P	Two suspected 15,000-gallon USTs formerly containing lube oil and quench oil	Former Building 46	1
Q	Two suspected 15,000 gallon USTs formerly containing lube oil	Former Building 47	1
R	Two suspected 350-gallon USTs formerly containing gasoline	Adjacent to former guard house along Northern site boundary	1
S	Five suspected USTs reportedly abandoned in place formerly containing fuel oil and oleum	Former Building 48	1



Table 3-1. Summary of Potential Recognized Environmental Conditions, Former West Pullman Works Site, Chicago, Illinois.

Page 3 of 3

Area Designation	Environmental Issue	Approximate Location	Task No.
T	Suspected oil collection pits	Former Building 46	2
U	Metal chip collection system	Former Building 45	2
V	Three suspected 12,000-gallon USTs formerly containing fuel oil	Northeast corner of Building 47	1

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Table 3-2. Summary of Subsurface Investigation Program, Former West Pullman Works Site, Chicago, Illinois

Page 1 of 3

Area Designation	Sample Identifier	Approximate Location	Laboratory Parameters	No. of Borings	No. of Samples
J	WPSB-1	Southeast corner of former Building 19	VOCs, PAHs, PCBs	1	1
K	WPSB-2	Southeast corner of former Building 47	VOCs, PAHs, PCBs	1	1
N	WPSB-3	Southeast corner of former Building 45	VOCs, PAHs, PCBs	1	1
L	WPSB-4 to 6	Former Oil Cooler Building	VOCs, PAHs, PCBs	3	3
B	WPSB-7 to 18	Wood Block Area on eastern third of site	VOCs, PAHs, PCBs, and acid extractable SVOCs	12	12
C	WPSB-19	Former Building 1-Former Copper Plating Building	pH, Total/TCLP Metals-Cd, Cr+3, Cr+6, Pb, Ni, Cu, and total CN-	1	1
I	WPSB-20	Former Sulfuric Acid AST	pH	1	1

Table 3-2. Summary of Subsurface Investigation Program, Former West Pullman Works Site, Chicago, Illinois

Area Designation	Sample Identifier	Approximate Location	Laboratory Parameters	No. of Borings	No. of Samples
J	WPSB-1	Southeast corner of former Building 19	VOCs, RAHs, PCBs	1	1
I	WPSB-21 to 24	Former Pickling Tank Area	pH, Total/TCLP Cr+3, Cr+6, Pb, Ni, Cu, and total CN-	4	4
I	WPSB-25 to 26	Sulfuric Acid Regeneration Tank	pH, Total/TCLP Metals-Cd, Cr+3, Cr+6, Pb, Ni, Cu, and total CN-	2	2
I	WPSB-27	Former Pickling Tank	pH, Total/TCLP Metals-Cd, Cr+3, Cr+6, Pb, Ni, Cu, and total CN-	1	1

Table 3-2. Summary of Subsurface Investigation Program, Former West Pullman Works Site, Chicago, Illinois

Page 3 of 3

Area Designation	Sample Identifier	Approximate Location	Laboratory Parameters	No. of Borings	No. of Samples
J	WPSB-1	Southeast corner of former Building 19	VOCs, PAHs, PCBs	1	1
A	WPSB-28 to 29	Former Building 24	VOCs, PAHs, pH, and Total /TCLP Pb	2	2
T	WPTS-1 and 2	Oil Collection Pits	VOCs, PAHs, PCBs	NA	2
U	WPTS-3 and 4	Metal Chip Collection System	VOCs, PAHs, PCBs	NA	2

g:\project navistar\ci0617 002 table3-2.xls

Table 3-3. Sample Container, Preservation and Holding Times,
Former West Pullman Works Site, Chicago, Illinois.

Matrix	Parameter	Sample Containers	Preservative	Holding Time
Soil	VOCs	(1) 4 oz glass jar	Ice; Cool to 4° C	14 days
Soil	PAHs, Acid extractable SVOCs, PCBs	(1) 16 oz glass jar	Ice; Cool to 4° C	14 days pre-extraction 40 days post-extraction
Soil	Metals/Cyanide	(1) 4 oz glass jar	Ice; Cool to 4° C	6 months (except mercury, 28 days and cyanide, 14 days)
Soil	TCLP Metals	(1) 8 oz glass jar	Ice; Cool to 4° C	6 months pre-extraction 6 months post-extraction (except mercury, 28 days pre-extraction 28 days post-extraction)

NOTES:

VOCs Volatile organic compounds.
 SVOCs Semi-volatile compounds
 PAHs Polynuclear aromatic hydrocarbons
 PCBs Polychlorinated biphenyls
 TCLP Toxicity characteristic leaching procedure.

Table 3-4. Analytical Parameters, Methods and Practical Quantitation Limits
Former West Pullman Works Site, Chicago, Illinois.

Test\ Procedure Parameter	SW-846 Method Reference	Practical Quantitation Limit
<u>Volatile Organic Compounds (ug/kg)</u>		
Acrylonitrile	8260	5.0
Benzene	8260	5.0
Bromobenzene	8260	5.0
Bromochloromethane	8260	5.0
Bromodichloromethane	8260	5.0
Bromoform	8260	5.0
Bromomethane	8260	5.0
n-Butylbenzene	8260	5.0
sec-Butylbenzene	8260	5.0
tert-Butylbenzene	8260	5.0
Carbon tetrachloride	8260	5.0
Chlorobenzene	8260	5.0
Chlorodibromomethane	8260	5.0
Chloroethane	8260	5.0
Chloroform	8260	5.0
Chloromethane	8260	5.0
2-Chlorotoluene	8260	5.0
4-Chlorotoluene	8260	5.0
1,2-Dibromo-3-chloropropane	8260	5.0
1,2-Dibromoethane (EDB)	8260	5.0
Dibromomethane	8260	5.0
1,2-Dichlorobenzene	8260	5.0
1,3-Dichlorobenzene	8260	5.0
1,4-Dichlorobenzene	8260	5.0
Dichlorodifluoromethane	8260	5.0
1,1-Dichloroethane	8260	5.0
1,2-Dichloroethane	8260	5.0
1,1-Dichloroethene	8260	5.0
cis-1,2-Dichloroethene	8260	5.0
trans-1,2-Dichloroethene	8260	5.0
1,2-Dichloropropane	8260	5.0
1,3-Dichloropropane	8260	5.0
2,2-Dichloropropane	8260	5.0
1,1-Dichloropropene	8260	5.0
cis, 1,3-Dichloropropene	8260	5.0
trans-1,3-Dichloropropene	8260	5.0
Ethylbenzene	8260	5.0
Hexachlorobutadiene	8260	5.0
Iodomethane	8260	5.0
Isopropylbenzene	8260	5.0



Table 3-4. Analytical Parameters, Methods and Practical Quantitation Limits
Former West Pullman Works Site, Chicago, Illinois.

Test\ Procedure Parameter	SW-846 Method Reference	Practical Quantitation Limit
p-Isopropyltoluene	8260	5.0
Methylene Chloride	8260	5.0
Methyl-tert-butyl ether	8260	5.0
Napthalene	8260	5.0
n-propylbenzene	8260	5.0
Styrene	8260	5.0
1,1,1,2-Tetrachloroethane	8260	5.0
1,1,1,2-Tetrachloroethane	8260	5.0
Tetrachloroethene	8260	5.0
Toluene	8260	5.0
1,2,3-Trichlorobenzene	8260	5.0
1,2,4-Trichlorobenzene	8260	5.0
1,1,1-Trichloroethane	8260	5.0
1,1,2-Trichloroethane	8260	5.0
Trichloroethene	8260	5.0
Trichlorofluoromethane	8260	5.0
1,2,3-Trichloropropane	8260	5.0
1,2,4-Trimethylbenzene	8260	5.0
1,3,5-Trimethylbenzene	8260	5.0
Vinyl chloride	8260	5.0
Xylenes	8260	5.0
<u>Semivolatile Organic Compounds (Acid Extractables only) (ug/kg)</u>		
4-Chloro-3-methylphenol	8270	330
2-Chlorophenol	8270	330
2,4-Dichlorophenol	8270	330
2,4-Dimethylphenol	8270	330
2,4-Dinitrophenol	8270	1,600
2-Methyl-4,6-dinitrophenol	8270	1,600
2-Methylphenol (o-Cresol)	8270	330
3-Methylphenol (m-Cresol)	8270	330
4-Methylphenol (p-Cresol)	8270	330
2-Nitrophenol	8270	330
4-Nitrophenol	8270	1,600
Pentachlorophenol	8270	1,600
Phenol	8270	330
2,4,6-Trichlorophenol	8270	330



Table 3-4. Analytical Parameters, Methods and Practical Quantitation Limits
Former West Pullman Works Site, Chicago, Illinois.

Test\ Procedure Parameter	SW-846 Method Reference	Practical Quantitation Limit
<u>Polynuclear Aromatic Hydrocarbon Compounds (mg/kg)</u>		
Acenaphthene	8310	0.660
Acenaphthylene	8310	0.660
Anthracene	8310	0.660
Benzo(a)anthracene	8310	0.0026
Benzo(b)fluoranthene	8310	0.0036
Benzo(k)fluoranthene	8310	0.0034
Benzo(a)pyrene	8310	0.0046
Benzo(ghi)perylene	8310	0.051
Chrysene	8310	0.03
Dibenzo(a,h)anthracene	8310	0.006
Fluoranthene	8310	0.660
Fluorene	8310	0.14
Indeno(1,2,3-cd)pyrene	8310	0.0086
Naphthalene	8310	0.025
Phenanthrene	8310	0.660
Pyrene	8310	0.18
<u>Polychlorinated Biphenyls (ug/kg)</u>		
PCB-1016	8081	50
PCB-1221	8081	50
PCB-1232	8081	50
PCB-1242	8081	50
PCB-1248	8081	50
PCB-1254	8081	50
PCB-1260	8081	50
<u>Total Metals and Cyanide (mg/kg)</u>		
Cadmium	6010	0.50
Chromium, Tri	6010	2.0
Chromium, Hex	7196	10.0
Copper	6010	0.50
Lead	6010	4.0
Nickel	6010	8.0
Cyanide	9010	2.0



Table 3-4. Analytical Parameters, Methods and Practical Quantitation Limits
Former West Pullman Works Site, Chicago, Illinois.

Test\ Procedure Parameter	SW-846 Method Reference	Practical Quantitation Limit
<u>TCLP Metals (mg/L)</u>		
Cadmium	6010	0.005
Chromium, Tri	6010	0.010
Chromium, Hex	7196	0.010
Copper	6010	0.025
Lead	6010	0.003
Nickel	6010	0.040

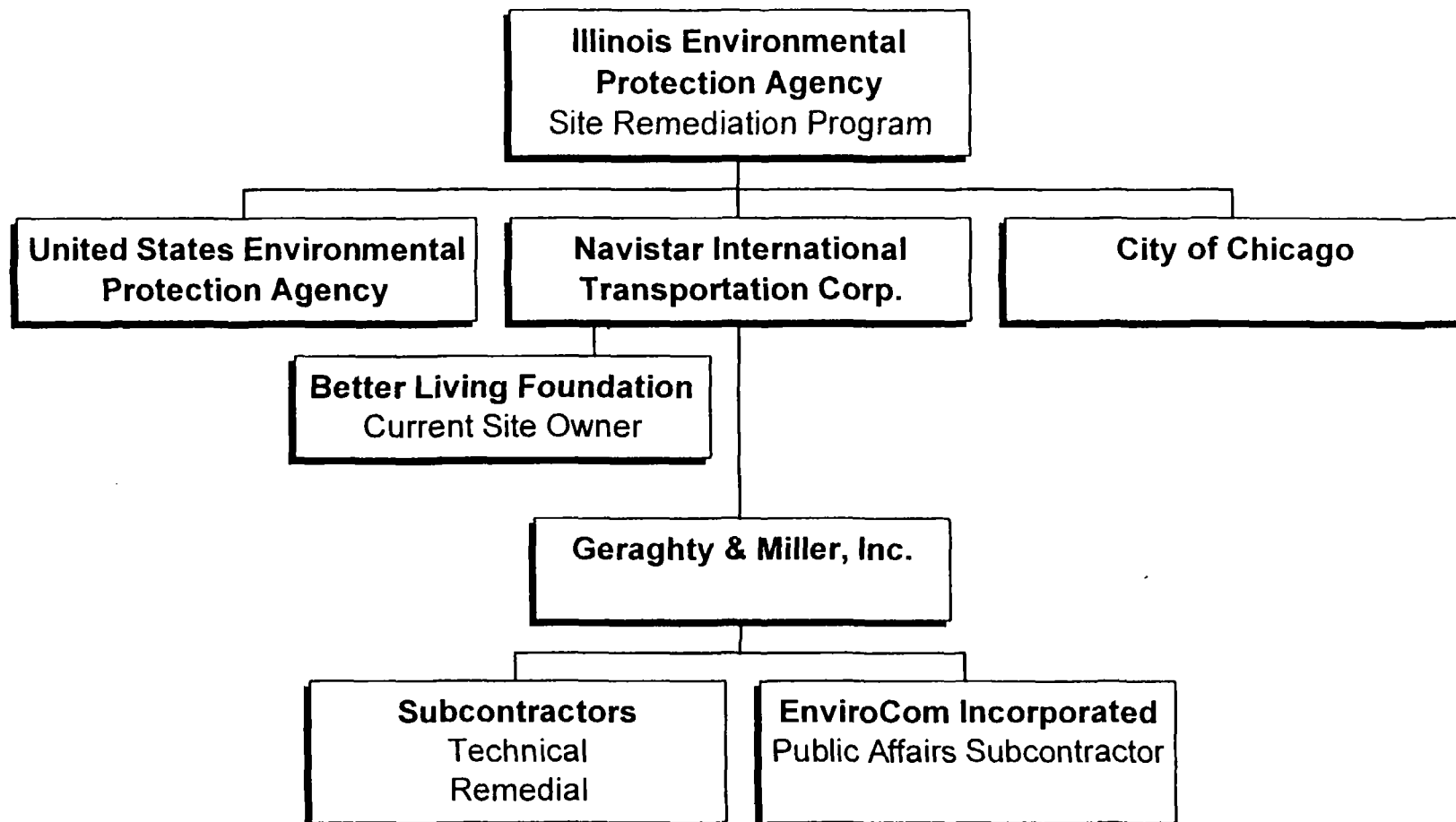


FIGURES



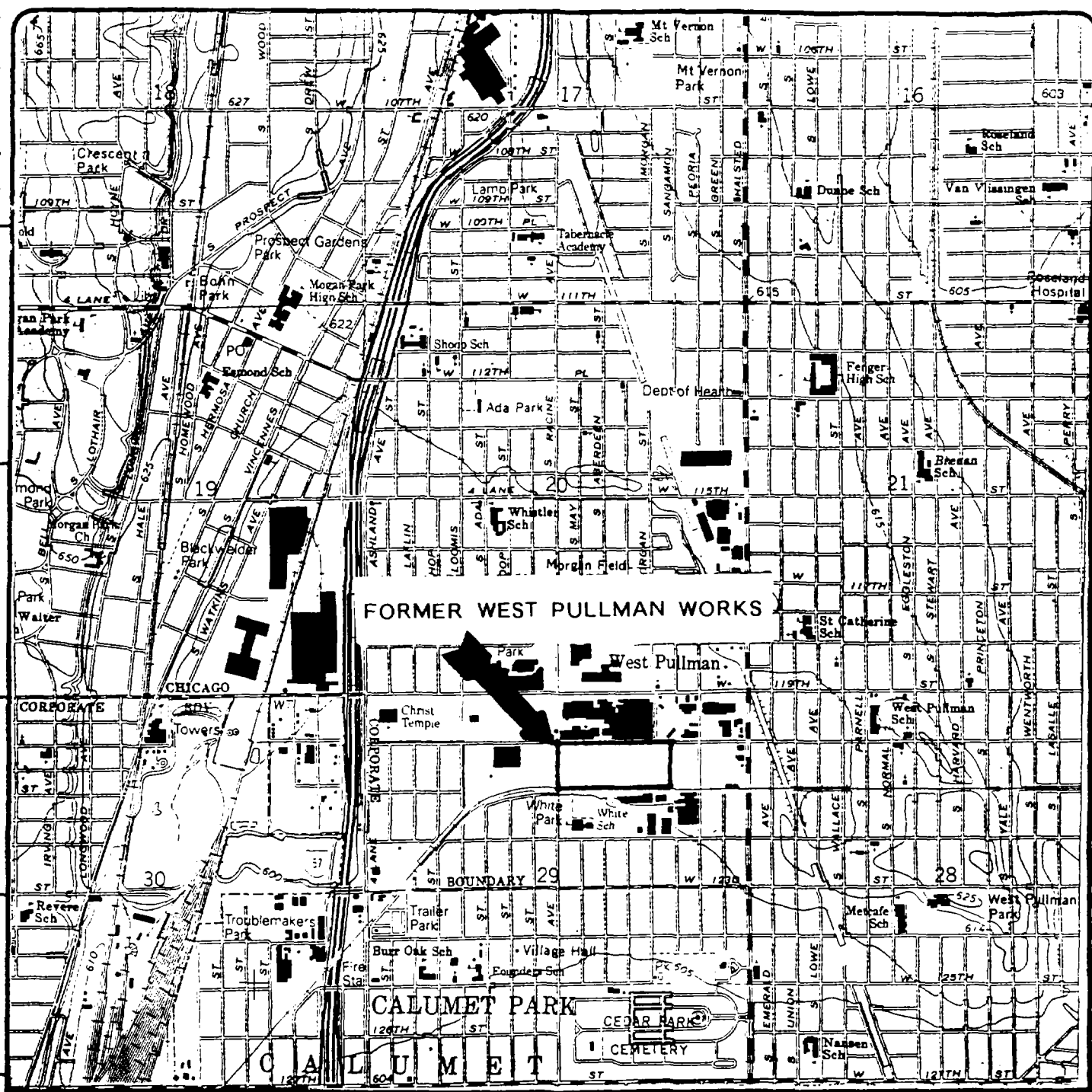
FIGURES



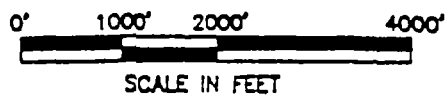


Project Organization
Figure 1-1

DRAFTER: S GUNER 1-1
 APPROVED: J AUER
 CHECKED: J
 DRAWING: CAD
 FILE NO.:
 PROJECT NO.: C-01/1001
 DWG DATE: 6/3/96



Source: USGS 7.5 Min. Topographic Map, Blue Island, IL Quadrangle, 1963, Photorevised 1973 and Photoinspected 1978.



SITE LOCATION MAP
 FORMER WEST PULLMAN WORKS SITE
 CHICAGO, ILLINOIS

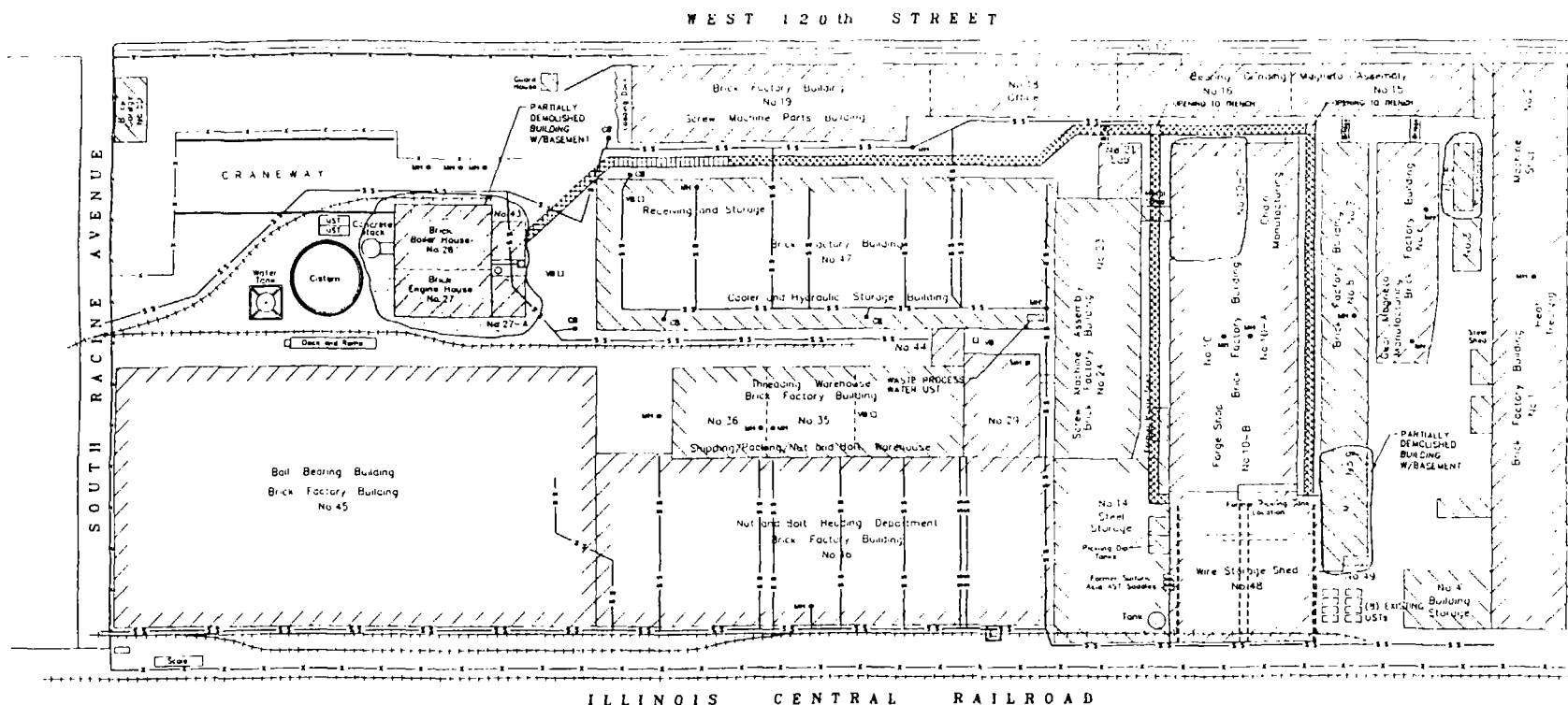
FIGURE
 2-1

[illegible]

ILLINOIS CENTRAL RAILROAD

- [illegible]

[illegible]



ILLINOIS CENTRAL RAILROAD

- LEGEND**
- EXISTING FENCE
 - MANHOLE EXISTING MANHOLE
 - CB EXISTING CATCH BASIN
 - VB EXISTING VALVE BOX
 - EXISTING DEBRIS PILE/BUILDING REMAINS
 - EXISTING OPEN PIPE TRENCH
 - EXISTING COVERED PIPE TRENCH
 - NOTR APPROXIMATE LOCATIONS SHOWN IN GREEN AND COVERED PIPE TRENCHES, MANHOLES, CATCH BASINS, VALVE BOXES, AND CENTRAL PILES
 - EXISTING SEWER LINE (APPROXIMATE LOCATION SHOWN)

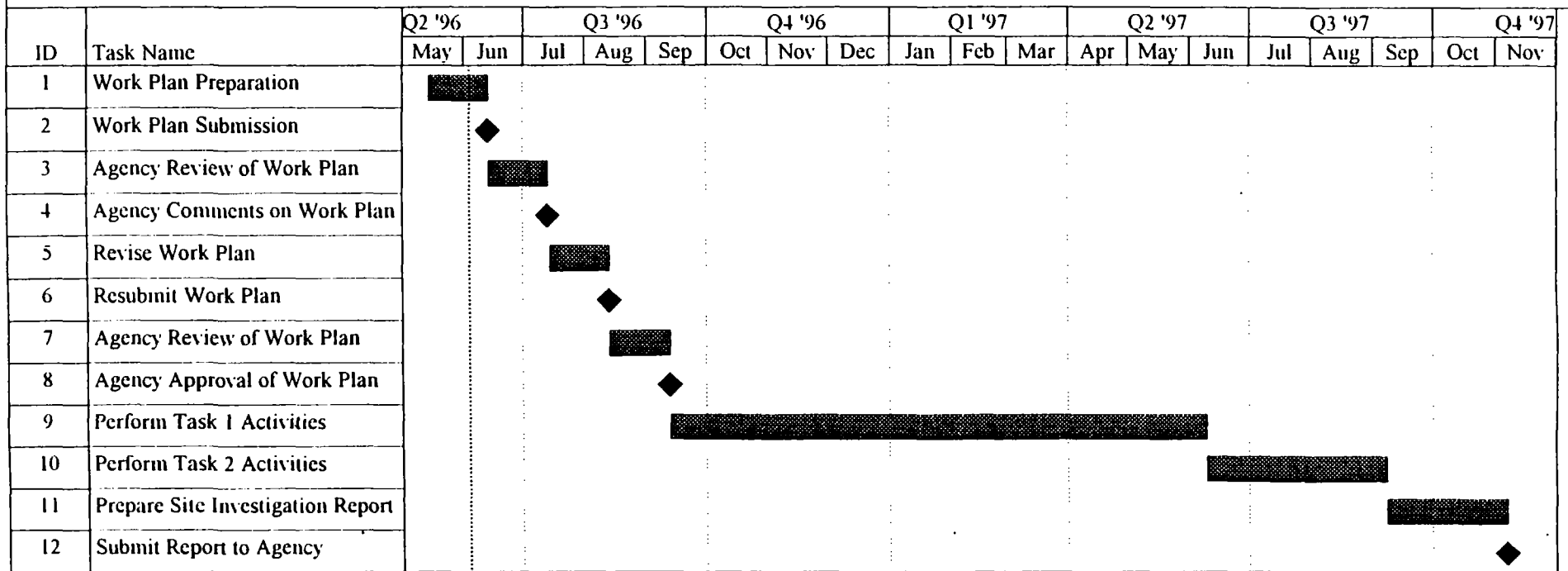
APPROXIMATE SCALE IN FEET
 BASED ON SOURCE: SULLIVAN AND SON LAND SURVEYORS, CHICAGO, ILLINOIS, PLAT OF SURVEY, OCTOBER 25th, 1908, ORDER NO. 407 FILE NO. 7-28
 DEPARTMENT NAME: SOURCE: BASED UPON INFORMATION ON FIGURE 3-1, ECOLOGY & ENVIRONMENT (1993). ALL BUILDINGS WERE DEMOLISHED TO THE CONCRETE FLOOR EXCEPT AS INDICATED



DATE	DESCRIPTION	BY	APP'D	DATE	DESCRIPTION	BY	APP'D	DATE	DESCRIPTION
10/1/93	GENERAL SITE LAYOUT	J. J. J.	J. J. J.	10/1/93	GENERAL SITE LAYOUT	J. J. J.	J. J. J.	10/1/93	GENERAL SITE LAYOUT
10/1/93	GENERAL SITE LAYOUT	J. J. J.	J. J. J.	10/1/93	GENERAL SITE LAYOUT	J. J. J.	J. J. J.	10/1/93	GENERAL SITE LAYOUT
10/1/93	GENERAL SITE LAYOUT	J. J. J.	J. J. J.	10/1/93	GENERAL SITE LAYOUT	J. J. J.	J. J. J.	10/1/93	GENERAL SITE LAYOUT
10/1/93	GENERAL SITE LAYOUT	J. J. J.	J. J. J.	10/1/93	GENERAL SITE LAYOUT	J. J. J.	J. J. J.	10/1/93	GENERAL SITE LAYOUT

GENERAL SITE LAYOUT
 FORMER WEST PULLMAN WORKS SITE
 CHICAGO, ILLINOIS

Figure 5-1
Former West Pullman Works
Voluntary Site Remediation Project Schedule



Project: Former West Pullman Works
Date: 6/4/96

Task



Summary



Rolled Up Progress



Progress



Rolled Up Task



Milestone



Rolled Up Milestone





APPENDIX A
SITE PHOTOGRAPHS





Photo #1: Black-stained concrete area in the central portion of the former location of Building 24



Photo #2: Oil-soaked wood blocks and stained soil material overlying concrete located across eastern third of northern site boundary



Photo #3: Yellowish-green stained soil overlying concrete adjacent to the former location of the copper plating building



Photo #4: Nine-inch vinyl floor tile located on former building floor at the central portion of the northern site boundary



Photo #5: Demolition debris containing transite, the grayish white curved pieces of building siding which contain asbestos



Photo #6: Two existing 10,000-gallon fuel oil USTs north of cistern (Note former smokestack and boiler house ruins in background of photo)



Photo #7: Eight existing 15,400-gallon USTs located in the southeastern corner of the site

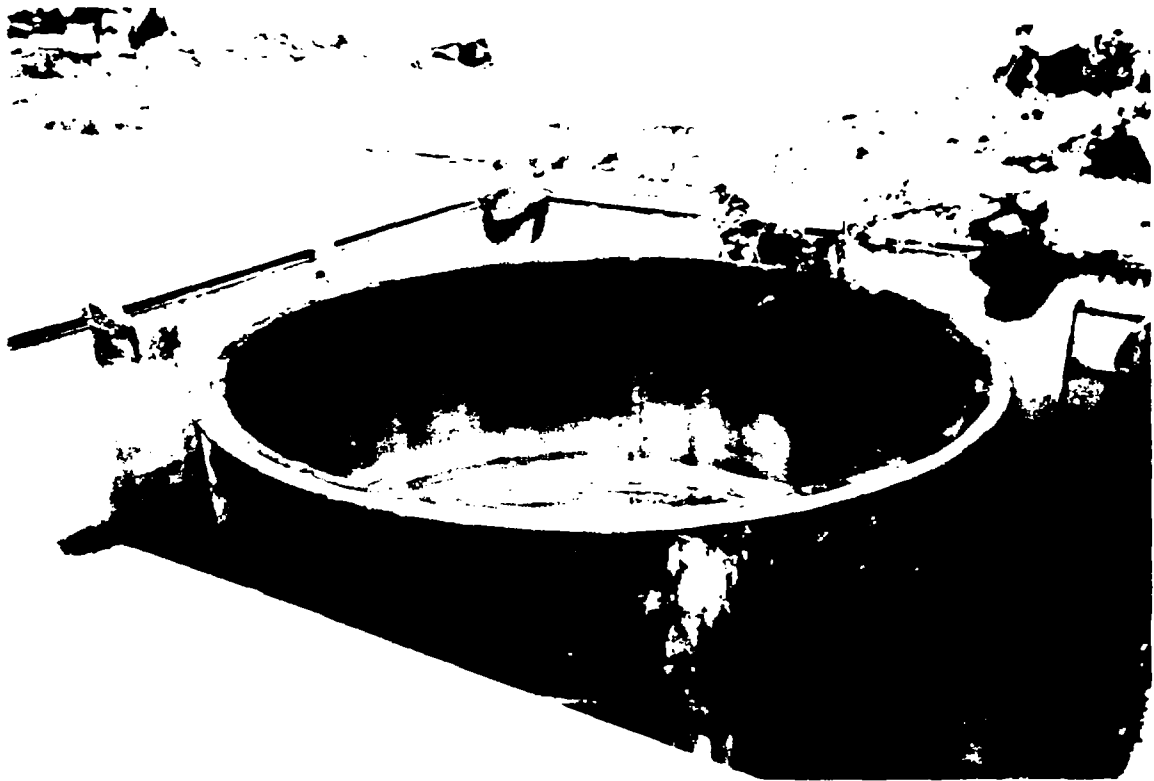


Photo #8: Steel mixing tank located in southeastern portion of the site which was formerly associated with sulfuric acid regeneration process



Photo #9: Three concrete saddles that formerly supported the sulfuric acid aboveground storage tank



Photo #10: Former pickling dip tanks located immediately north of the former sulfuric acid tank location



Photo #11: Manways and manholes located in the foundation of the former oil cooler building foundation

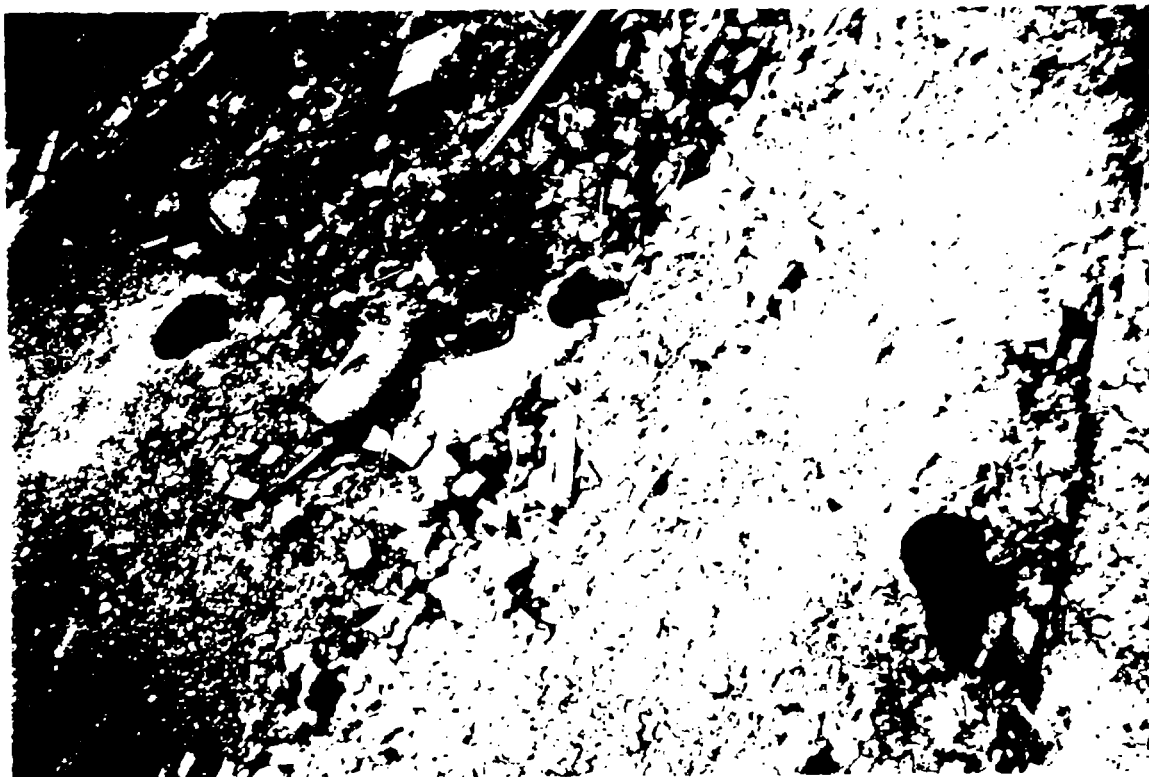


Photo #12: Pipe openings located along the east side of the boiler house ruins representing a suspected UST area



Photo #13: Bolted-on cap located adjacent to pipe opening east of boiler house ruins related to the suspected presence of USTs



Photo #14: Suspected UST area located adjacent to manhole containing oil observed during the site inspection



Photo #15: Suspected location of three 12,000-gallon USTs located in the southeast corner of Building 47 along the southern property boundary



Photo #16: Suspected UST area and oil staining located along the railroad siding at the southern property boundary

APPENDIX B



APPENDIX B
FIELD DATA FORMS





APPENDIX C



APPENDIX C

SITE-SPECIFIC QUALITY ASSURANCE PROTOCOL



APPENDIX C SITE-SPECIFIC QUALITY ASSURANCE REFERENCE GUIDE

1.0 INTRODUCTION

- This guide indicates options selected and variations from the IEPA AQAP provided in Appendix D.

2.0 DATA QUALITY OBJECTIVES

- Level IIIB has been selected for laboratory data because the data may be used to demonstrate the attainment of site cleanup objectives.

3.0 QUALITY ASSURANCE OBJECTIVES FOR MEASUREMENT DATA

- No changes.

3.1 LEVEL OF QUALITY CONTROL EFFORT

- See Section 4.0 of Work Plan
- See Table 2-1 in AQAP (frequency of lab QC samples)

3.2 PRECISION AND ACCURACY

- Consistent with Level IIIB

3.3 REPRESENTATIVENESS, COMPLETENESS, AND COMPARABILITY

- Consistent with Level IIIB

4.0 SAMPLE CUSTODY, CONTAINERS, PRESERVATION, AND HOLDING TIMES

- See Section 3 and Table 3-3 in Work Plan

5.0 ANALYTICAL PROCEDURES AND CALIBRATIONS

- See Table 3.4 of Work Plan

6.0 DATA REDUCTION, VALIDATION, AND REPORTING

- No changes



7.0 INTERNAL QUALITY CONTROL CHECKS

7.1 FIELD SAMPLE COLLECTION

- See Section 3 of Work Plan

8.0 PERFORMANCE AND SYSTEMS AUDITS

- No changes

9.0 CALCULATIONS AND DATA QUALITY INDICATORS

- No changes

10.0 CORRECTIVE ACTIONS

- No changes



APPENDIX D

;

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Table 1-2
Semivolatile Organic Analytical Parameters
and Required Quantitation Limits

Compound	Water (ug/L)	Low Soil (ug/Kg)	Med. Soil (ug/Kg)	Method
Phenol	10	660	10000	8270A
bis(2-Chloroethyl) ether	10	660	10000	8270A
2-Chlorophenol	10	660	10000	8270A
1,2-Dichlorobenzene	10	660	10000	8270A
1,3-Dichlorobenzene	10	660	10000	8270A
1,4-Dichlorobenzene	10	660	10000	8270A
2-Methylphenol	10	660	10000	8270A
2,2'-oxybis (1-chloropropane)	10	660	10000	8270A
4-Methylphenol	10	660	10000	8270A
N-Nitroso-di-n-propylamine	10	660	10000	8270A
Hexachloroethane	10	660	10000	8270A
Nitrobenzene	10	660	10000	8270A
Isophorone	10	660	10000	8270A
2-Nitrophenol	10	660	10000	8270A
2,4-Dimethylphenol	10	660	10000	8270A
bis(2-Chloroethoxy) methane	10	660	10000	8270A
2,4-Dichlorophenol	10	660	10000	8270A
1,2,4-Trichlorobenzene	10	660	10000	8270A
Naphthalene	10	660	10000	8270A
4-Chloroaniline	10	660	10000	8270A
Hexachlorobutadiene	10	660	10000	8270A
4-Chloro-3-methylphenol	10	660	10000	8270A
2-Methylnaphthalene	10	660	10000	8270A
Hexachlorocyclopentadiene	10	660	10000	8270A
2,4,6-Trichlorophenol	10	660	10000	8270A
2,4,5-Trichlorophenol	25	1600	25000	8270A
2-Chloronaphthalene	10	660	10000	8270A
2-Nitroaniline	25	1600	25000	8270A
Dimethylphthalate	10	660	10000	8270A
Acenaphthalene	10	660	10000	8270A
2-Nitrotoluene	10	660	10000	8270A
3-Nitroaniline	25	1600	25000	8270A
Acenaphthene	10	660	10000	8270A
2,4-Dinitrophenol	25	1600	25000	8270A
4-Nitrophenol	25	1600	25000	8270A

Required Quantitation Limits for soil are based on wet weight. Normally data is reported on a dry weight basis; therefore, Reporting Limits will be higher, based on the % solids in each sample. This is based on a 30 gram sample and GPC cleanup

See Section 1.4 for description of circumstances for the analyses of these compounds at these detection limits.

The laboratory shall report non surrogate components, tentatively identified by library search, conducted per the guidelines contained in the analytical method.

Table 1-2
Semivolatile Organic Analytical Parameters
and Required Quantitation Limits

Compound	Water (ug/L)	Low Soil (ug/Kg)	Med. Soil (ug/Kg)	Method
Dibenzofuran	10	330	10000	8270A
2,4-Dinitrotoluene	10	330	10000	8270A
Diethylphthalate	10	330	10000	8270A
4-Chlorophenyl-phenyl ether	10	330	10000	8270A
Flourene	10	330	10000	8270A
4-Nitroaniline	25	1600	25000	8270A
4,6-Dinitro-2-methylphenol	25	1600	25000	8270A
N-nitrosodiphenylamine	10	330	10000	8270A
4-Bromophenyl-phenyl ether	10	330	10000	8270A
Hexachlorobenzene	10	330	10000	8270A
pentachlorophenol	25	1600	25000	8270A
Phenanthrene	10	660	10000	8270A
Anthracene	10	660	10000	8270A
Carbazole	10	660	10000	8270A
Di-n-butylphthalate	10	660	10000	8270A
Fluoranthene	10	660	10000	8270A
Pyrene	10	660	10000	8270A
Butylbenzylphthalate	10	660	10000	8270A
3,3'-Dichlorobenzidine	10	660	10000	8270A
Benzo(a)anthracene	10	660	10000	8270A
Chrysene	10	660	10000	8270A
bis(2-Ethylhexyl)phthalate	10	660	10000	8270A
Di-n-octylphthalate	10	660	10000	8270A
Benzo(b)fluoranthene	10	660	10000	8270A
Benzo(k)fluoranthene	10	660	10000	8270A
Benzo(a)pyrene	10	660	10000	8270A
Indeno(1,2,3-cd)pyrene	10	660	10000	8270A
Dibenz(a,h)anthracene	10	660	10000	8270A
Benzo(g,h,i)perylene	10	660	10000	8270A

Required Quantitation Limits for soil are based on wet weight. Normally data is reported on a dry weight basis; therefore, Reporting Limits will be higher, based on the % solids in each sample. This is based on a 30 gram sample and GPC cleanup.

See Section 1.4. [redacted] description of circumstances for the analyses of these compounds at these detection limits.

The laboratory shall report non surrogate components, tentatively identified by library search conducted per the guidelines contained in the analytical method.

Table 1-3 Pesticide and Aroclors Organic Analytical Parameters and Required Quantitation Limits			
Compound	Water (ug/L)	Low Soil (ug/Kg)	Method
alpha-BHC	0.05	8.0	8081
beta-BHC	0.05	8.0	8081
delta-BHC	0.05	8.0	8081
gamma-BHC	0.05	8.0	8081
Heptachlor	0.05	8.0	8081
Aldrin	0.05	8.0	8081
Heptachlor epoxide	0.05	8.0	8081
Endosulfan I	0.05	8.0	8081
Dieldrin	0.10	16.0	8081
4,4'-DDE	0.10	16.0	8081
Endrin	0.10	16.0	8081
Endosulfan II	0.10	16.0	8081
4,4'-DDD	0.10	16.0	8081
Endosulfan sulfate	0.10	16.0	8081
4,4'-DDT	0.10	16.0	8081
Methoxychlor	0.50	80.0	8081
Endrin ketone	0.10	16.0	8081
endrin aldehyde	0.10	16.0	8081
alpha-Chlordane	0.50	80.0	8081
gamma-Chlordane	0.50	80.0	8081
Toxaphene	1.0	160.0	8081
Aroclor - 1016	0.50	80.0	8081
Aroclor - 1221	0.50	80.0	8081
Aroclor - 1232	0.50	80.0	8081
Aroclor - 1242	0.50	80.0	8081
Aroclor - 1248	0.50	80.0	8081
Aroclor - 1254	1.0	160.0	8081
Aroclor - 1260	1.0	160.0	8081

Required Quantitation Limits for soil are based on wet weight. Normally data is reported on a dry weight basis; therefore, Reporting Limits will be higher, based on the % solids in each sample.

See Section 1.4 for description of circumstances for the analyses of these compounds at these detection limits.

<p align="center">Table 1-4 Inorganic Analytical Parameters and Required Quantitation Limits</p>			
Analyte	Water (ug/L)	Soil (mg/Kg)	Method
Aluminum	200	40	6010A
Antimony	60	12	6010A
Arsenic	10	2	7060A/7061A /7062
Barium	200	40	6010A
Beryllium	5	1	6010A
Cadmium	5	1	6010A
Calcium	5000	1000	6010A
Chromium	10	2	6010A
Cobalt	50	10	6010A
Copper	25	5	6010A
Iron	100	20	6010A
Lead	3	0.6	7421
Magnesium	5000	1000	6010A
Manganese	15	3	6010A
Mercury	0.2	0.04	7470A/7471A
Nickel	40	8	6010A
Potassium	5000	1000	6010A
Selenium	5	1	7740A/7741A /7742
Silver	10	2	6010A
Sodium	5000	1000	6010A
Thallium	10	2	7841
Vanadium	50	10	6010A
Zinc	20	4	6010A
Fluoride	10	2	9012

Required Quantitation Limits for soil are based on wet weight. Normally data is reported on a dry weight basis; therefore, Reporting Limits will be higher, based on the percent dry weight in each sample.

See Section 1.4 for description of appropriate circumstances for the analyses of these analytes at these detection limits.

Table 1-5 Organic Analytical Parameters and Estimated Detection Limits			
Compound	Method	Water (ug/L)	Soil (ug/Kg)
1,1 Dichloroethene	8240B	5.0	250.0
1,1,1,2-Tetrachloroethane	8021A	0.05	0.05
1,1,1,2-Tetrachloroethane	8260A	0.3	0.3
1,1,1,2-Tetrachloroethane	8240B	5.0	250.0
1,1,1,2-Tetrachloroethane	8010B	—	—
1,1,1-Trichloroethane	8021A	0.3	0.3
1,1,1-Trichloroethane	8010B	0.3	0.3
1,1,1-Trichloroethane	8260A	0.4	0.4
1,1,1-Trichloroethane	8240B	5.0	250.0
1,1,2,2-Tetrachloroethane	8021A	0.1	0.1
1,1,2,2-Tetrachloroethane	8260A	0.2	0.2
1,1,2,2-Tetrachloroethane	8010B	0.3	0.3
1,1,2,2-Tetrachloroethane	8240B	5.0	250.0
1,1,2-Trichloroethane	8010B	0.2	0.2
1,1,2-Trichloroethane	8260A	0.5	0.5
1,1,2-Trichloroethane	8240B	5.0	250.0
1,1,2-Trichloroethane	8021A	—	—
1,1-Dichloroethane	8260A	0.2	0.2
1,1-Dichloroethane	8010B	0.7	0.7
1,1-Dichloroethane	8021A	0.7	0.7
1,1-Dichloroethane	8240B	5.0	250.0
1,1-Dichloroethane	8260A	0.6	0.6
1,1-Dichloroethane	8021A	0.7	0.7
1,1-Dichloroethane	8010B	1.3	1.3
1,1-Dichloropropene	8021A	0.2	0.2
1,2,3,4-Tetrachlorobenzene	8121	0.11	7.37
1,2,3,5-Tetrachlorobenzene	8121	0.081	5.427
1,2,3-Trichlorobenzene	8121	0.39	26.13
1,2,3-Trichlorobenzene	8260A	0.2	0.2
1,2,3-Trichlorobenzene	8021A	0.3	0.3
1,2,3-Trichloropropane	8260A	1.6	1.6
1,2,3-Trichloropropane	8021A	4.0	4.0
1,2,3-Trichloropropane	8240B	5.0	250.0
1,2,3-Trichloropropane	8010B	—	—
1,2,4,5-Tetrachlorobenzene	8121	0.095	6.365
1,2,4,5-Tetrachlorobenzene	8270B	10.0	660.0
1,2,4,5-Tetrachlorobenzene	8250A	25.0	1650
1,2,4-Trichlorobenzene	8121	1.3	87.1
1,2,4-Trichlorobenzene	8260A	0.2	0.2
1,2,4-Trichlorobenzene	8021A	0.2	0.2
1,2,4-Trichlorobenzene	8120A	0.5	33.5
1,2,4-Trichlorobenzene	8270B	10.0	660.0
1,2,4-Trichlorobenzene	8250A	19	1273
1,2,4-Trimethylbenzene	8021A	0.5	0.5
1,2,4-Trimethylbenzene	8260A	0.7	0.7
1,2-Dibromo-3-Chloropropane	8021A	30.0	30.0
1,2-Dibromo-3-chloropropane	8240B	100.0	5000.0
1,2-Dibromoethane	8260A	0.3	0.3
1,2-Dibromoethane	8240B	5.0	250.0
1,2-Dibromoethane	8021A	8.0	8.0
1,2-Dichlorobenzene	8260	0.2	0.2
1,2-Dichlorobenzene	8021A	0.2	0.2
1,2-Dichlorobenzene	8121	2.7	180.9
1,2-Dichlorobenzene	8010B	1.5	1.5

Table 1-5 (page 2) Organic Analytical Parameters and Estimated Detection Limits			
Compound	Method	Water (ug/L)	Soil (ug/Kg)
1,2-Dichlorobenzene	8020B	4.0	4.0
1,2-Dichlorobenzene	8270B	10.0	660.0
1,2-Dichlorobenzene	8120A	11.4	763.8
1,2-Dichlorobenzene	8250A	19.0	1260
1,2-Dichloroethane	8010B	0.3	0.3
1,2-Dichloroethane	8021A	0.3	0.3
1,2-Dichloroethane	8260A	0.3	0.3
1,2-Dichloroethane	8240B	5.0	250.0
1,2-Dichloropropane	8021A	0.06	0.06
1,2-Dichloropropane	8260A	0.2	0.2
1,2-Dichloropropane	8010B	0.4	0.4
1,2-Dichloropropane	8240B	5.0	250.0
1,2-Dinitrobenzene	8270B	40.0	ND
1,2-Diphenylhydrazine	8250A	50	3300
1,3,5-Trichlorobenzene	8121	0.12	8.04
1,3,5-Trimethylbenzene	8021A	0.04	0.04
1,3,5-Trinitrobenzene	8270B	10.0	660.0
1,3-Dichlorobenzene	8021A	0.2	0.2
1,3-Dichlorobenzene	8121	2.5	167.5
1,3-Dichlorobenzene	8260A	0.6	0.6
1,3-Dichlorobenzene	8010B	3.2	3.2
1,3-Dichlorobenzene	8020B	4.0	4.0
1,3-Dichlorobenzene	8270B	10.0	660.0
1,3-Dichlorobenzene	8120A	11.9	797.3
1,3-Dichlorobenzene	8250A	19	1273
1,3-Dichloropropane	8260A	0.2	0.2
1,3-Dichloropropane	8021A	0.3	0.3
1,3-Dinitrobenzene	8270B	20.0	ND
1,4-Dichloro-2-butene	8240B	100.0	5000.0
1,4-Dichlorobenzene	8021A	0.07	0.07
1,4-Dichlorobenzene	8260A	0.2	0.2
1,4-Dichlorobenzene	8121	8.9	596.3
1,4-Dichlorobenzene	8010B	2.4	2.4
1,4-Dichlorobenzene	8020B	3.0	3.0
1,4-Dichlorobenzene	8270B	10.0	660.0
1,4-Dichlorobenzene	8120A	13.4	897.8
1,4-Dichlorobenzene	8250A	44	2948
1,4-Dichlorobenzene-d4 (I.S.)	8250A	44	2948
1,4-Dinitrobenzene	8270B	40.0	ND
1,4-Nitrophenol	8270B	10.0	ND
1,4-Pyridinediamine	8270B	10.0	ND
1,4-Xylene	8260A	0.3	0.3
1-Chloronaphthalene	8250A	50	3300
1-Naphthylamine	8270B	10.0	660
1-Naphthylamine	8250A	50	3300
2,2-Dichloropropane	8021A	0.5	0.5
2,2-Dichloropropane	8260A	1.8	1.8
2,3,4,6-Tetrachlorophenol	8270B	10.0	660
2,3,4,6-Tetrachlorophenol	8250A	50	3300
2,4,5-T	8151	0.08	0.3
2,4,5-T	8150B	2.0	40.0
2,4,5-TP	8151	0.075	0.28
2,4,5-TP (Silvex)	8150B	1.7	34.0

Table 1-5 (page 3) Organic Analytical Parameters and Estimated Detection Limits			
Compound	Method	Water (ug/L)	Soil (ug/Kg)
2,4,5-Trichlorophenol	8270B	10.0	660.0
2,4,5-Trichlorophenol	8250A	50	3300
2,4,5-Trimethylaniline	8270B	10.0	ND
2,4,6-Tribromophenol (surr.)	8250A	--	--
2,4,6-Trichlorophenol	8040A	6.4	428.8
2,4,6-Trichlorophenol	8270B	10.0	660.0
2,4,6-Trichlorophenol	8250A	27	1810
2,4-D	8151	0.2	0.11
2,4-D	8150B	12.0	240.0
2,4-DB	8150B	9.1	182.0
2,4-Diaminotoluene	8270B	20.0	ND
2,4-Dichlorophenol	8040A	3.9	261.3
2,4-Dichlorophenol	8270B	10.0	660.0
2,4-Dichlorophenol	8250A	27	1810
2,4-Dimethylphenol	8040A	3.2	214.4
2,4-Dimethylphenol	8270B	10.0	660.0
2,4-Dimethylphenol	8250A	27	1810
2,4-Dinitrophenol	8250A	42	2814
2,4-Dinitrophenol	8270B	50.0	3300.0
2,4-Dinitrophenol	8040A	130.0	8710.0
2,4-Dinitrotoluene	8090	0.2	13.4
2,4-Dinitrotoluene	8270B	10.0	660.0
2,4-Dinitrotoluene	8250A	57	3819
2,6-Dichlorophenol	8270B	10.0	ND
2,6-Dichlorophenol	8250A	50.0	3300
2,6-Dichlorophenol	8040A	--	--
2,6-Dinitrotoluene	8090	0.1	6.7
2,6-Dinitrotoluene	8270B	10.0	660.0
2,6-Dinitrotoluene	8250A	19	1273
2-Acetylaminofluorene	8270B	20.0	ND
2-Aminoanthraquinone	8270B	20.0	ND
2-Butanone	8240B	100.0	5000.0
2-Chloroethyl vinyl ether	8010B	1.3	1.3
2-Chloroethyl vinyl ether	8240B	10.0	500.0
2-Chloronaphthalene	8121	13.	871
2-Chloronaphthalene	8120A	9.4	629.8
2-Chloronaphthalene	8270B	10.0	660.0
2-Chloronaphthalene	8250A	19	1273
2-Chlorophenol	8040A	3.1	207.7
2-Chlorophenol	8270B	10.0	660.0
2-Chlorophenol	8250A	33	2211
2-Chlorotoluene	8021A	0.1	0.1
2-Chlorotoluene	8260A	0.2	0.2
2-Cyclohexyl-4,6-dinitrophenol	8270B	100.0	ND
2-Cyclohexyl-4,6-dinitrophenol	8040A	--	--
2-Fluorobiphenyl (surr.)	8250A	--	--
2-Fluorophenol (surr.)	8250A	--	--
2-Hexanone	8240B	50.0	2500.0
2-Methyl-4,6-dinitrophenol	8040A	160.0	10720.0
2-Methylnaphthalene	8270B	10.0	660.0
2-Methylnaphthalene	8250A	25	1650
2-Methylphenol	8270B	10.0	660.0
2-Methylphenol	8250A	25	1650
2-Naphthylamine	8270B	10.0	ND
2-Naphthylamine	8250A	25	1650
2-Nitroaniline	8270B	50.0	3300.0

Table 1-5 (page 4)
Organic Analytical Parameters and
Estimated Detection Limits

Compound	Method	Water (ug/L)	Soil (ug/Kg)
2-Nitroaniline	8250A	50	3300
2-Nitrophenol	8040A	4.5	301.5
2-Nitrophenol	8270B	10.0	660.0
2-Nitrophenol	8250A	36	2412
2-Picoline	8250A	-	-
2-Picoline	8270B	ND	ND
2-sec-Butyl-4,6-dinitrophenol	8040A	-	-
2,4-DB	8151	0.8	
3,3'-Dichlorobenzidine	8270B	20.0	1300.0
3,3'-Dichlorobenzidine	8250A	165	1155
3,3'-Diethoxybenzidine	8270B	100.0	ND
3,3'-Dimethylbenzidine	8270B	10.0	ND
3,5-Dichlorobenzoic acid	8151	0.061	0.38
3-(Chloromethyl)pyridine hydrochloride	8270B	100.0	ND
3-Hydroxycarbofuran	8318	2.6	10
3-Methylcholanthrene	8270B	10.0	660
3-Methylcholanthrene	8250A	50	3300
3-Methylphenol	8270B	10.0	660
3-Nitroaniline	8270B	50.0	3300.0
3-Nitroaniline	8250A	50.0	3300
4,4'-DDD	8081	0.05	4.2
4,4'-DDD	8080B	0.11	7.4
4,4'-DDD	8250A	28	1876
4,4'-DDE	8080B	0.04	2.7
4,4'-DDE	8081	0.058	2.5
4,4'-DDE	8250A	56	3752
4,4'-DDT	8081	0.081	3.6
4,4'-DDT	8080B	0.12	8.0
4,4'-DDT	8250A	47	3149
4,4'-Methoxychlor	8081	0.086	5.7
4,4'-Methylenebis(2-chloroaniline)	8270B	NA	ND
4,4'-Oxydianiline	8270B	20.0	ND
4,6-Dinitro-2-methylphenol	8250A	24	1608
4,6-Dinitro-2-methylphenol	8270B	50.0	3300.0
4-Aminobiphenyl	8270B	20.0	1320
4-Aminobiphenyl	8250A	50.0	3300
4-Bromophenyl phenyl ether	8110	23	1500
4-Bromophenyl phenyl ether	8250A	19	1273
4-Chloro-3-methylphenol	8250A	50.0	3300
4-Chloro-3-methylphenol	8040A	3.6	241.2
4-Chloro-3-methylphenol	8270B	20.0	1300.0
4-Chloroaniline	8270B	20.0	1300.0
4-Chloroaniline	8250A	50.0	3300
4-Chlorophenyl phenyl ether	8110	39	2600
4-Chlorophenyl phenyl ether	8270B	10.0	660.0
4-Chlorophenyl phenyl ether	8250A	42	2814
4-Chlorotoluene	8021A	0.1	0.1
4-Chlorotoluene	8260A	0.3	0.3
4-Methyl-2-pentanone	8240B	50.0	2500.0
4-Methylphenol	8270B	10.0	660.0
4-Methylphenol	8250A	50.0	3300
4-Nitroaniline	8270B	20.0	1320
4-Nitroaniline	8250A	50.0	3300
4-Nitrobiphenyl	8270B	10.0	ND
4-Nitrophenol	8151	0.13	0.34
4-Nitrophenol	8250A	24	1590

Table 1-5 (page 5)
Organic Analytical Parameters and
Estimated Detection Limits

Compound	Method	Water (ug/L)	Soil (ug/Kg)
4-Nitrophenol	8040A	28.0	1876.0
4-Nitrophenol	8270B	50.0	3300.0
4-Nitroquinoline-1-oxide	8270B	40.0	ND
4-bromophenyl phenyl ether	8270B	10.0	660.0
5,5-Diphenylhydantoin	8270B	20.0	ND
5-Chloro-2-methylaniline	8270B	10.0	ND
5-Hydroxydicamba	8151	0.04	
5-Nitro-o-anisidine	8270B	10.0	ND
5-Nitro-o-toluidine	8270B	10.0	ND
5-Nitroacenaphthene	8270B	10.0	ND
7,12-Dimethylbenz(a)anthracene	8270B	10.0	ND
7,12-Dimethylbenz(a)anthracene	8250A	50.0	3300
Acenaphthene	8270B	10.0	660.0
Acenaphthene	8310	18.0	1206.0
Acenaphthene	8250A	19	1273
Acenaphthene-d10 (I.S.)	8250A	—	—
Acenaphthylene	8270B	10.0	660.0
Acenaphthylene	8310	23.0	1541.0
Acenaphthylene	8250A	35	2345
Acetaldehyde	8315	171	
Acetone	8240B	100.0	5000.0
Acetonitrile	8240B	100.0	5000.0
Acetophenone	8270B	10.0	ND
Acetophenone	8250A	50.0	3300
Acifluorfen	8151	0.96	
Acrolein	8030A	7.0	7.0
Acrolein (Propenal)	8316	30	
Acrylamide	8032	0.032	—
Acrylamide	8316	10	
Acrylonitrile	8030A	5.0	5.0
Acrylonitrile	8316	20	
Acrylonitrile	8031	10.0	—
Aldicarb (Temik)	8318	9.4	12
Aldicarb Sulfone	8318	1.9	44
Aldrin	8081	0.034	2.2
Aldrin	8080B	0.04	2.7
Aldrin	8250A	19	1273
Allyl chloride	8240B	5.0	250.0
Aminazobenzene	8270B	10.0	ND
Aminazobenzene	8270B	100.0	ND
Aminazobenzene	8250A	—	—
Anthracene	8310	6.6	442.2
Anthracene	8270B	10.0	660.0
Anthracene	8250A	19	1273
Aramite	8270B	20.0	ND
Aroclor-1016	8081	0.054	57
Aroclor-1016	8250A	—	—
Aroclor-1016	8080B	0.5	80
Aroclor-1221	8081	—	—
Aroclor-1221	8080B	0.5	80
Aroclor-1221	8250A	3	21
Aroclor-1232	8081	—	—
Aroclor-1232	8080B	0.5	80
Aroclor-1232	8250A	—	—
Aroclor-1242	8080B	0.5	43.6
Aroclor-1242	8081	—	—
Aroclor-1242	8250A	—	—

Table 1-5 (page 6)
Organic Analytical Parameters and
Estimated Detection Limits

Compound	Method	Water (ug/L)	Soil (ug/Kg)
Aroclor-1248	8081	—	—
Aroclor-1248	8080B	0.5	80
Aroclor-1248	8250A	—	—
Aroclor-1254	8080B	1	160
Aroclor-1254	8081	—	—
Aroclor-1254	8250A	36	2412
Aroclor-1260	8081	0.9	70
Aroclor-1260	8080B	1	160
Aroclor-1260	8250A	—	—
Azinphos methyl	8141A	1.0	50.0
Azinphos methyl	8140	15.0	1005.0
Azinphos-methyl	8270B	100.0	ND
Barban	8270B	200.0	ND
Bentazon	8151	0.2	—
Benzo(a)anthracene	8270B	10.0	660.0
Benzal chloride	8121	0.05	3.35
Benzene	8021A	0.09	0.09
Benzene	8260A	0.2	0.2
Benzene	8020B	2.0	2.0
Benzene	8240B	5.0	250.0
Benzidine	8250A	44	2948
Benzo(a)anthracene	8310	0.1	8.7
Benzo(a)anthracene	8250A	78	5226
Benzo(a)pyrene	8310	0.2	15.4
Benzo(a)pyrene	8270B	10.0	660.0
Benzo(a)pyrene	8250A	25	1675
Benzo(b)fluoranthene	8310	0.2	12.1
Benzo(b)fluoranthene	8270B	10.0	660.0
Benzo(b)fluoranthene	8250A	48	3216
Benzo(g,h,i)perylene	8270B	10.0	660.0
Benzo(g,h,i)perylene	8250A	41	2747
Benzo(ghi)perylene	8310	0.8	50.9
Benzo(k)fluoranthene	8310	0.2	11.4
Benzo(k)fluoranthene	8270B	10.0	660.0
Benzo(k)fluoranthene	8250A	25	1675
Benzoic acid	8270B	50.0	3300.0
Benzoic acid	8250A	—	—
Benzotrichloride	8121	0.06	4.02
Benzyl chloride	8010B	—	—
Benzyl alcohol	8270B	20.0	1300.0
Benzyl alcohol	8250A	—	—
Benzyl benzoate	8061	—	—
Benzyl butyl phthalate	8060	3.4	227.8
Benzyl chloride	8121	1.8	120.6
Benzyl chloride	8240B	100.0	5000.0
Bis(2-chloroethoxy) methane	8110	5	335
Bis(2-chloroethoxy) methane	8270B	10.0	660.0
Bis(2-chloroethoxy) methane	8250A	53	3551
Bis(2-chloroethyl) ether	8110	3.0	200
Bis(2-chloroethyl) ether	8270B	10.0	660.0
Bis(2-chloroethyl) ether	8250A	57	3819
Bis(2-chloroisopropyl) ether	8110	8.0	530
Bis(2-chloroisopropyl) ether	8270B	10.0	660.0
Bis(2-chloroisopropyl) ether	8250A	57	3819
Bis(2-ethoxyethyl) phthalate	8061	2.7	180.9

APPENDIX D

**ANALYTICAL QUALITY ASSURANCE PLAN FOR THE
ILLINOIS ENVIRONMENTAL PROTECTION AGENCY
BUREAU OF LAND PRE-NOTICE SITE CLEANUP PROGRAM**



Analytical Quality Assurance Plan
for the
Illinois Environmental Protection Agency
Bureau of Land
Pre-Notice Site Cleanup Program

Revision 1



Prepared by:
Illinois Environmental Protection Agency
Division of Laboratories
Quality Assurance Section
February 10, 1995

INTRODUCTION

The Illinois Environmental Protection Agency's Bureau of Land Pre-Notice Site Cleanup Program (Program) has established data quality objectives and data quality assurance requirements applicable to all laboratory analytical data intended to support Program critical determinations and decisions. This document identifies the Program objectives and the minimum requirements for the generation of laboratory analytical data. This document does not address the generation of field analytical data, nor field quality assurance procedures.

All laboratory analytical data submitted to the Agency intended to support Program critical decisions and determinations must be scientifically valid, defensible, sufficiently documented, and of known precision, accuracy and completeness. Adherence to the Program data quality objectives and analytical quality assurance requirements identified in this document will minimize the generation of laboratory analytical data of a quality unacceptable to the Agency.

This document contains descriptions of the Program data quality objectives and the specific analytical methods, required quantitation limits, quality assurance / quality control (QA/QC) procedures, data documentation requirements, and data reporting requirements necessary to meet Program data quality objectives. Laboratory protocols for the preparation of sample containers, sample handling, sample storage, and sample chain-of-custody which meet Program data quality objectives are also included.

All QA/QC procedures identified in this document are in accordance with applicable professional technical standards, State of Illinois regulations and guidelines, Agency requirements, and specific Bureau of Land Pre-Notice Site Cleanup Program data quality objectives.

Persons requesting the Agency's review and evaluation services are responsible for validation and certification in accordance with this document of all laboratory analytical data submitted in support of Program critical decisions or determinations.

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Appendix A Data Reporting Instructions and Forms



1.0 PROGRAM DESCRIPTION

1.1 PROGRAM OVERVIEW

Pre-Notice Site Cleanup Program (Program) projects generally are comprised of one or both of the following elements:

1. Site investigation conducted pursuant to an Agency approved Site Investigation Work Plan; and
2. Site remediation conducted pursuant to an Agency approved Site Remedial Action Work Plan.

1.2 SITE SPECIFIC PROJECT OBJECTIVES

The Program is reliant upon voluntary participation by a site owner or operator, or her or his express written designee (participant). Site specific project objectives are identified by the participant requesting the Agency's review and evaluation services and are not typically imposed by the Agency.

1.3 PROGRAM CRITICAL DECISIONS AND DETERMINATIONS

1.3.1 Definitions of Categories of Critical Decisions and Determinations

In order to meet their project objectives, Program participants may request the Agency's review and evaluation of critical decisions and determinations. These decisions and determinations can be divided into two categories, which are identified as follows:

CATEGORY

- A. Identification of the classes of chemicals of concern and subsequent reduction of sampling and analytical requirements for site remedial response activities;
- B. Demonstration of the sufficiency of site characterizations, investigations and establishment of site cleanup objectives; and the demonstration of attainment of site cleanup objectives and specific project objectives.

1.3.2 Analytical Support for Critical Decisions and Determinations

Initial site investigations to determine contaminants of concern for subsequent investigations and remediation require Category A determinations. For Category A determinations the laboratory analytical support must provide for detections of a large number of potential contaminants. However, quantitation limits of the analytical support for Category A determinations may not be sufficient to support Category B decisions and determinations.

Routine site investigations to determine the full nature and extent of site contamination and the demonstration of attainment of Agency-established cleanup objectives requires Category B decisions and determinations. For Category B determinations and decisions the laboratory analytical support will require sample analyses for either a reduced list of potential contaminants utilizing lower quantitation limits than those applied in initial investigations; or a list of known contaminants utilizing quantitation levels at or below the Agency-established cleanup objective concentrations.

1.4 ANALYTICAL PARAMETERS FOR CATEGORIES OF DECISIONS AND DETERMINATIONS

1.4.1 Category A

Tables 1-1 through 1-4 contain a list of the analytical parameters, their Required Quantitation Limits (RQLs), and the USEPA analytical method number, for use in the generation of data used for Category A decisions and determinations. Required Quantitation Limits for soil are based on wet weight. Normally data is reported on a dry weight basis; therefore, Reporting Limits will be higher, based on the % solids in each sample.

1.4.2 Category B

Tables 1-5 and 1-6 contain a list of analytical parameters, various Estimated Quantitation Limits (EQLs), and the USEPA analytical method number, for use in the generation of data used for Category B decisions and determinations. The participants Project Manager should consult with the Illinois EPA Project Manager to determine the exact list of parameters for Category B decisions and determinations and the EQLs acceptable for the Category B decisions and determinations. EQLs for soil are based on wet weight. Normally data is reported on a dry weight basis; therefore, Reporting Limits will be higher, based on the % solids in each sample. The USEPA analytical method selected for use must have a EQL which meets or is lower than the Illinois EPA Clean-up Objectives.

1.5 ANALYTICAL SUPPORT - LEVELS OF DATA QUALITY

The following definitions of data quality levels are provided for reference. ALL Pre-Notice Program laboratory chemical analyses in support of both categories of decisions and determinations must be at Level III (see definition below) and meet the minimum requirements specified in this Analytical Quality Assurance Plan. For Category B decisions and determinations, the USEPA analytical method selected for use must have estimated quantitation limits which meets or is lower than the Agency-established Clean-up Objectives.

Level I - Screening: This provides the lowest data quality but the most rapid results. It is often used for health and safety monitoring at the site, initial site characterization to locate areas for subsequent and more accurate analyses, and for engineering screening of alternatives (bench-scale tests). These types of data include those generated on-site through the use of HNu, pH, conductivity, and other real-time monitoring equipment at the site.

Level II - Field Analyses: This provides rapid results and better quality than in Level I. This level may include mobile lab generated data depending on the level of quality control exercised. The field analyses can provide data from the analyses of air, soil, sediment, and water for many organic and inorganic analytes.

Level III - Engineering: This provides an intermediate level of data quality designed to provide confirmed identification and quantification of organic and inorganic analytes in water, soil, and sediment media. Level III protocols all have built-in QA/QC including external QA in the form of trip blanks, replicate samples, and blind samples. Level III analytical methods and protocols are identified in Test Methods For Evaluating Solid Waste, Physical/Chemical Methods, SW-846, 3rd Edition and subsequent Updates. Level III data is used for site characterization, confirmation of Level I and Level II field data, establishing cleanup objectives, and environmental monitoring to demonstrate attainment of cleanup objectives or compliance with applicable standards. Level III data should provide sufficient documentation to allow qualified personnel to review, evaluate and validate data quality in accordance with acknowledged standards and protocols.

Level IV - Confirmational: This provides the highest level of data quality and is used for purposes of risk assessment and evaluation of remedial alternatives. These analyses require full USEPA Contract Laboratory Program (CLP) analytical and data validation procedures in accordance with EPA recognized protocol. Level IV analyses are typically required for the conduct of CERCLA compliant and equivalent remedial response activities.

Level V - Non-Standard: This refers to analyses by non-standard protocols, for example, when exacting detection limits or analysis of an unusual chemical compound is required. These analyses often require method development or adaptation. The level of quality control is usually similar to Level IV data. The Illinois Environmental Protection Agency must be consulted for protocol approval before any non-standard methods may be utilized for Program sites. Level V poses limitations because of the amount of lead time for start up may be significant and analyses may be one-of-a-kind, resulting in a lack of comparability of the data.




Table 1-1 Volatile Organics Analytical Parameters and Required Quantitation Limits				
Compound	Water (ug/L)	Low Soil (ug/Kg)	Med. Soil (ug/Kg)	Method
Chloromethane	10	10	1200	8260A
Bromomethane	10	10	1200	8260A
Vinyl Chloride	10	10	1200	8260A
Chloroethane	10	10	1200	8260A
Methylene Chloride	10	10	1200	8260A
Acetone	10	10	1200	8260A
Carbon Disulfide	10	10	1200	8260A
1,1-Dichloroethene	10	10	1200	8260A
1,1-Dichloroethane	10	10	1200	8260A
1,2-Dichloroethene (total)	10	10	1200	8260A
Chloroform	10	10	1200	8260A
1,2-Dichloroethane	10	10	1200	8260A
2-Butanone	10	10	1200	8260A
1,1,1-Trichloroethane	10	10	1200	8260A
Carbon Tetrachloride	10	10	1200	8260A
Bromodichloromethane	10	10	1200	8260A
1,2-Dichloropropane	10	10	1200	8260A
cis-1,3-Dichloropropene	10	10	1200	8260A
Trichloroethene	10	10	1200	8260A
Dibromochloromethane	10	10	1200	8260A
1,1,2-Trichloroethane	10	10	1200	8260A
Benzene	10	10	1200	8260A
trans-1,3-Dichloropropene	10	10	1200	8260A
Bromoform	10	10	1200	8260A
4-Methyl-2-pentanone	10	10	1200	8260A
2-Hexanone	10	10	1200	8260A
Tetrachloroethene	10	10	1200	8260A
Toluene	10	10	1200	8260A
1,1,2,2-Tetrachloroethane	10	10	1200	8260A
Chlorobenzene	10	10	1200	8260A
Ethyl Benzene	10	10	1200	8260A
Styrene	10	10	1200	8260A
Sum of 11 (total)	10	10	1200	8260A

Required Quantitation Limits for soil are based on wet weight. Normally data is reported on a dry weight basis; therefore, Reporting Limits will be higher, based on the percent dry weight in each sample.

See Section 1.4 for description of circumstances for the analyses of these compounds at these detection limits.

The laboratory shall report non surrogate components, tentatively identified by library search conducted per the guidelines contained in the analytical method.

Table 1-5 (page 7)
Organic Analytical Parameters and
Estimated Detection Limits

Compound	Method	Water (ug/L)	Soil (ug/Kg)
Bis(2-ethylhexyl) phthalate	8061	2.7	180.9
Bis(2-ethylhexyl) phthalate	8270B	10.0	660.0
Bis(2-ethylhexyl) phthalate	8060	20.0	1340.0
Bis(2-ethylhexyl) phthalate	8250A	25	1675
Bis(2-methoxyethyl) phthalate	8061	5.1	341.7
Bis(2-n-butoxyethyl) phthalate	8061	0.84	56.28
Bis(4-methyl-2-pentyl) phthalate	8061	3.7	247.9
Bolstar	8140	1.5	100.5
Bolstar (Sulprofos)	8141A	0.7	35.0
Bromobenzene	8021A	0.06	0.06
Bromobenzene	8260A	0.2	0.2
Bromobenzene	8010B	-	-
Bromochloromethane	8021A	0.1	0.1
Bromochloromethane	8260A	0.2	0.2
Bromodichloromethane	8021A	0.2	0.2
Bromodichloromethane	8260A	0.4	0.4
Bromodichloromethane	8010B	1.0	1.0
Bromodichloromethane	8240B	5.0	250.0
Bromoform	8260A	0.6	0.6
Bromoform	8010B	2.0	2.0
Bromoform	8240B	5.0	250.0
Bromoform	8021A	16.0	16.0
Bromomethane	8260A	0.6	0.6
Bromomethane	8010B	3.0	3.0
Bromomethane	8240B	10.0	500.0
Bromomethane	8021A	11.0	11.0
Bromoxynil	8270B	10.0	ND
Butyl benzyl phthalate	8061	0.42	28.14
Butyl benzyl phthalate	8270B	10.0	660.0
Butyl benzyl phthalate	8250A	25	1675
Captan	8270B	20.0	ND
Captan	8270B	50.0	ND
Carbaryl	8270B	10.0	ND
Carbaryl (Sevin)	8318	1.7	31
Carbofuran	8270B	10.0	ND
Carbofuran (Furadan)	8318	2	22
Carbon Tetrachloride	8021A	0.1	0.1
Carbon disulfide	8240B	100.0	5000.0
Carbon tetrachloride	8260A	1.1	1.1
Carbon tetrachloride	8010B	1.2	1.2
Carbon tetrachloride	8240B	5.0	250.0
Chlorobenzothion	8270B	10.0	ND
Chloramben	8151	0.093	4
Chlordane	8250A	-	-
Chlordane (technical)	8080B	0.1	9.4
Chlorfenvinphos	8270B	20.0	ND
Chlorobenzene	8021A	0.03	0.03
Chlorobenzene	8260A	0.2	0.2
Chlorobenzene	8020B	2.0	2.0
Chlorobenzene	8010B	2.5	2.5
Chlorobenzene	8240B	5.0	250.0
Chlorobenzilate	8270B	10.0	ND
Chlorodibromomethane	8240B	5.0	250.0
Chloroethane	8260A	0.5	0.5
Chloroethane	8021A	1.0	1.0
Chloroethane	8010B	5.2	5.2
Chloroethane	8240B	10.0	500.0

Table 1-5 (page 8) Organic Analytical Parameters and Estimated Detection Limits			
Compound	Method	Water (ug/L)	Soil (ug/Kg)
Chloroform	8021A	0.2	0.2
Chloroform	8010B	0.5	0.5
Chloroform	8240B	5.0	250.0
Chloromethane	8021A	0.3	0.3
Chloromethane	8260A	0.7	0.7
Chloromethane	8010B	0.8	0.8
Chloromethane	8240B	10.0	500.0
Chloroprene	8240B	5.0	250.0
Chlorpyrifos	8141A	0.7	50.0
Chlorpyrifos	8140	3.0	201.0
Chrysene	8310	1.5	100.5
Chrysene	8270B	10.0	660.0
Chrysene	8250A	25	1675
Chrysene-d12 (I.S.)	8250A	—	—
Coumaphos	8141A	2.0	100.0
Coumaphos	8140	15.0	1005.0
Coumaphos	8270B	40.0	ND
Cresols (methyl phenol)	8040A	—	—
Crotoxyphos	8270B	20.0	ND
DBCP	8011	0.1	—
DCPA diacid	8151	0.02	—
Dalapon	8151	1.3	0.12
Dalapon	8150B	58.0	1160.0
Demeton, O, S	8141A	1.2	60.0
Demeton-O	8140	2.5	167.5
Demeton-S	8140	2.5	167.5
Demeton-o	8270B	10.0	ND
Demeton-s	8270B	10.0	ND
Di-n-butyl phthalate	8061	3.3	221.1
Di-n-butyl phthalate	8060	3.6	241.2
Di-n-butyl phthalate	8270B	10.0	ND
Di-n-butylphthalate	8250A	25	1675
Di-n-octyl phthalate	8061	0.49	32.83
Di-n-octyl phthalate	8270B	10.0	660.0
Di-n-octyl phthalate	8060	30.0	2010.0
Di-n-octylphthalate	8250A	25	1675
Diallate (cis or trans)	8270B	10.0	ND
Diallate (trans or cis)	8270B	10.0	ND
Diallylphthalate	8061	1.1	73.7
Dibenz(a,h)anthracene	8141A	2.0	100.0
Dibenz(a,h)anthracene	8140	6.0	402.0
Dibenz(a,h)anthracene	8270B	10.0	660.0
Dibenz(a,h)anthracene	8250A	25	1675
Dibenz(a,j)acridine	8270B	10.0	ND
Dibenz(a,j)acridine	8250A	—	—
Dibenz(a,e)pyrene	8270B	10.0	ND
Dibenzo(a,h)anthracene	8310	0.3	20.1
Dibenzofuran	8270B	10.0	660.0
Dibenzofuran	8250A	—	—
Dibromochloromethane	8260A	0.3	0.3
Dibromochloromethane	8021A	0.3	0.3
Dibromochloromethane	8010B	0.9	0.9
Dibromomethane	8260A	1.2	1.2
Dibromomethane	8240B	5.0	250.0
Dibromomethane	8021A	22.0	22.0
Dibromomethane	8010B	—	—
Dicamba	8151	0.081	—

Table 1-5 (page 9)
Organic Analytical Parameters and
Estimated Detection Limits

Compound	Method	Water (ug/L)	Soil (ug/Kg)
Dichlone	8270B	—	ND
Dichlorodifluoromethane	8021A	0.5	0.5
Dichlorodifluoromethane	8250A	0.5	0.5
Dichlorodifluoromethane	8240B	5.0	250.0
Dichlorodifluoromethane	8010B	—	—
Dichloromethane	8010B	—	—
Dichloroprop	8150B	6.5	130.0
Dichlorovos	8270B	10.0	ND
Dichloroprop	8151	0.26	—
Dichlorvos	8140	1.0	67.0
Dichlorvos	8141A	8.0	400.0
Dicrotophos	8270B	10.0	ND
Dicyclohexyl phthalate	8061	0.22	14.74
Dieldrin	8080B	0.02	13
Dieldrin	8081	0.044	—
Dieldrin	8250A	25	1675
Diethyl ether	8015A	—	—
Diethyl phthalate	8061	2.5	167.5
Diethyl phthalate	8060	4.9	328.3
Diethyl phthalate	8270B	10.0	660.0
Diethyl sulfate	8270B	100.0	ND
Diethylphthalate	8250A	19	1273
Diethylstilbestrol	8270B	20.0	ND
Dihexyl phthalate	8061	0.68	45.56
Diisobutyl phthalate	8061	1.2	80.4
Dimethoate	8141A	2.6	130.0
Dimethoate	8270B	20.0	ND
Dimethyl phthalate	8060	2.9	194.3
Dimethyl phthalate	8061	6.4	428.8
Dimethyl phthalate	8270B	10.0	660.0
Dimethylaminoazobenzene	8270B	10.0	ND
Dimethylphthalate	8250A	16	172
Dinitrobenzene	8090	—	—
Dinocap	8270B	100.0	ND
Dinonyl phthalate	8061	0.22	14.74
Dinoseb	8151	0.19	—
Dinoseb	8150B	0.7	14.0
Dinoseb	8270B	20.0	ND
Dinoseb	8318	2.2	>50
Dibutylamine	8250A	—	—
Disulfoton	8141A	0.7	35.0
Disulfoton	8140	2.0	134.0
Disulfoton	8270B	10.0	ND
EDB	8011	0.1	—
EPN	8141A	0.4	20.0
EPN	8270B	10.0	ND
Endosulfan I	8081	0.03	2.1
Endosulfan I	8080B	0.14	9.4
Endosulfan I	8250A	—	—
Endosulfan II	8081	0.04	2.4
Endosulfan II	8080B	0.04	2.7
Endosulfan II	8250A	—	—
Endosulfan Sulfate	8081	0.035	3.6
Endosulfan sulfate	8080B	0.7	44.2
Endosulfan sulfate	8250A	56	3752
Endrin	8081	0.039	3.6

Table 1-5 (page 10) Organic Analytical Parameters and Estimated Detection Limits			
Compound	Method	Water (µg/L)	Soil (µg/Kg)
Endrin aldehyde	8081	0.05	1.6
Endrin aldehyde	8080B	0.2	15.4
Endrin aldehyde	8250A	—	—
Endrin ketone	8250A	—	—
Ethanol	8015A	—	—
Ethion	8270B	10.0	ND
Ethoprop	8141A	2.0	100.0
Ethoprop	8140	2.5	167.5
Ethyl Benzene	8020B	2.0	2.0
Ethyl carbamate	8270B	50.0	ND
Ethyl methacrylate	8240B	5.0	250.0
Ethyl methanesulfonate	8270B	20.0	ND
Ethyl methanesulfonate	8250A	—	—
Ethylbenzene	8021A	0.05	0.05
Ethylbenzene	8260A	0.3	0.3
Ethylbenzene	8240B	5.0	250.0
Famphur	8270B	20.0	ND
Fensulfothion	8141A	0.8	40.0
Fensulfothion	8140	15.0	1005.0
Fensulfothion	8270B	40.0	ND
Fenthion	8141A	0.8	50.0
Fenthion	8140	1.0	67.0
Fenthion	8270B	10.0	ND
Fluchloralin	8270B	20.0	ND
Fluoranthene	8270B	10.0	660.0
Fluoranthene	8250A	22	1474
Fluoranthrene	8310	2.1	140.7
Fluorene	8310	2.1	140.7
Fluorene	8270B	10.0	660.0
Fluorene	8250A	—	—
Formaldehyde	8315	7.2	—
Heptachlor	8080B	0.03	2.0
Heptachlor	8081	0.04	2
Heptachlor	8250A	19	1273
Heptachlor epoxide	8081	0.032	2.1
Heptachlor epoxide	8080B	0.8	55.6
Heptachlor epoxide	8250A	22	1474
Hexachlorobenzene	8121	0.056	3.752
Hexachlorobenzene	8120A	0.5	33.5
Hexachlorobenzene	8270B	10.0	660.0
Hexachlorobenzene	8250A	19	1273
Hexachlorobutadiene	8121	0.014	0.938
Hexachlorobutadiene	8021A	0.2	0.2
Hexachlorobutadiene	8260A	0.6	0.6
Hexachlorobutadiene	8120A	3.4	227.8
Hexachlorobutadiene	8250A	9	63
Hexachlorobutadiene	8270B	10.0	660.0
Hexachlorocyclohexane	8120A	—	—
Hexachlorocyclopentadiene	8121	2.4	160.8
Hexachlorocyclopentadiene	8120A	4	268
Hexachlorocyclopentadiene	8270B	10.0	660.0
Hexachlorocyclopentadiene	8250A	—	—
Hexachloroethane	8121	0.016	1.072
Hexachloroethane	8120A	0.3	20.1

Table 1-5 (page 11)
Organic Analytical Parameters and
Estimated Detection Limits

Compound	Method	Water (ug/L)	Soil (ug/Kg)
Hexachloroethane	8270B	10.0	660.0
Hexachloroethane	8250A	16	172
Hexachlorophene	8270B	50.0	ND
Hexachloropropene	8270B	10.0	ND
Hexamethyl phosphoramidate	8270B	20.0	ND
Hexyl 2-ethylhexyl phthalate	8061	1.3	87.1
Hydroquinone	8270B	ND	ND
1,1-Dichloropropene	8260A	0.5	0.5
1-Acetyl-2-thiourea	8270B	1000.0	ND
Indeno(1,2,3-cd)pyrene	8310	0.4	28.8
Indeno(1,2,3-cd)pyrene	8270B	10.0	660.0
Indeno(1,2,3-cd)pyrene	8250A	37	2479
Isobutyl alcohol	8240B	100.0	5000.0
Isodrin	8270B	20.0	ND
Isophorone	8270B	10.0	660.0
Isophorone	8250A	22	1474
Isophorone	8090	157.0	10519.0
Isopropylbenzene	8021A	0.5	0.5
Isopropylbenzene	8260A	0.8	0.8
Isosafrole	8270B	10.0	ND
Kepone	8270B	20.0	ND
Leptophos	8270B	10.0	ND
MCPA	8151	0.056	43
MCPA	8150B	2490.0	49800.0
MCPP	8151	0.09	66
MCPP	8150B	1920.0	38400.0
Malathion	8141A	1.1	55.0
Malathion	8270B	50.0	ND
Maleic anhydride	8270B	NA	ND
Merphos	8141A	2.0	100.0
Merphos	8140	2.5	167.5
Mestanol	8270B	20.0	ND
Methacrylonitrile	8240B	100.0	5000.0
Methapyrilene	8270B	100.0	ND
Methiocarb (Mesuro)	8318	3.1	32
Methomyl (Lannate)	8318	1.7	12
Methoxychlor	8080B	1.8	117.9
Methoxychlor	8270B	10.0	ND
Methoxychlor	8250A	-	-
Methyl ethyl ketone (MEK)	8015A	-	-
Methyl iodide	8240B	5.0	250.0
Methyl isobutyl ketone (MIBK)	8015A	-	-
Methyl methacrylate	8240B	5.0	2500.0
Methyl methanesulfonate	8270B	10.0	ND
Methyl methanesulfonate	8250A	-	-
Methyl parathion	8270B	10.0	ND
Methylene Chloride	8021A	0.2	0.2
Methylene chloride	8260A	0.2	0.2
Methylene chloride	8240B	5.0	250.0
Mevinphos	8140	3.0	201.0
Mevinphos	8141A	5.0	250.0
Mevinphos	8270B	10.0	ND
Mexacarbate	8270B	20.0	ND
Mirex	8270B	10.0	ND
Monocrotophos	8270B	40.0	ND
N-Nitroso-di-N-propylamine	8250A	-	-
N-Nitroso-di-N-butylamine	8250A	-	-

Table 1-5 (page 12)
Organic Analytical Parameters and
Estimated Detection Limits

Compound	Method	Water (ug/L)	Soil (ug/Kg)
N-Nitroso-di-n-propylamine	8270B	10.0	660.0
N-Nitrosodi-n-propylamine	8070	4.6	308.2
N-Nitrosodibutylamine	8270B	10.0	ND
N-Nitrosodiethylamine	8270B	20.0	ND
N-Nitrosodimethylamine	8070	1.5	100.5
N-Nitrosodimethylamine	8250A	-	-
N-Nitrosodiphenylamine	8070	8.1	542.7
N-Nitrosodiphenylamine	8270B	10.0	660.0
N-Nitrosodiphenylamine	8250A	19	1273
N-Nitrosopiperidine	8270B	20.0	ND
N-Nitrosopiperidine	8250A	-	-
N-Nitrosopyrrolidine	8270B	40.0	ND
Naled	8140	1.0	67.0
Naled	8141A	5.0	250.0
Naled	8270B	20.0	ND
Naphthalene	8260A	0.2	0.2
Naphthalene	8021A	0.6	0.6
Naphthalene	8270B	10.0	660.0
Naphthalene	8250A	16	172
Naphthalene	8310	18.0	1206.0
Naphthalene-d8 (I.S.)	8250A	-	-
Naphthoquinone	8090	-	-
Nicotine	8270B	20.0	ND
Nitrobenzene	8270B	10.0	660.0
Nitrobenzene	8250A	19	1273
Nitrobenzene	8090	137.0	9179.0
Nitrobenzene-d5 (surr.)	8250A	-	-
Nitrofen	8270B	20.0	ND
O,O,O-Triethylphosphorothioate	8270B	NT	ND
OCDD	8280	-	-
Octamethyl pyrophosphoramidate	8270B	200.0	ND
Parathion	8270B	10.0	ND
Parathion methyl	8140	0.3	20.1
Parathion-ethyl	8141A	0.6	30.0
Parathion-methyl	8141A	1.2	60.0
Pentachlorobenzene	8121	0.38	25.46
Pentachlorobenzene	8270B	10.0	ND
Pentachlorobenzene	8250A	-	-
Pentachloroethane	8240B	10.0	500.0
Pentachlorohexane	8120A	-	-
Pentachloronitrobenzene	8270B	20.0	ND
Pentachloronitrobenzene	8250A	-	-
Pentachlorophenol	8151	0.076	0.16
Pentachlorophenol	8250A	36	2412
Pentachlorophenol	8270B	50.0	3300.0
Pentachlorophenol	8040A	74.0	4958.0
Perylene-d12 (I.S.)	8250A	-	-
Phenacetin	8270B	20.0	ND
Phenacetin	8250A	-	-
Phenanthrene	8310	6.4	428.8
Phenanthrene	8270B	10.0	660.0
Phenanthrene	8250A	54	3618
Phenanthrene-d10 (I.S.)	8250A	-	-
Phenobarbital	8270B	10.0	ND
Phenol	8040A	1.4	93.8
Phenol	8270B	10.0	660.0
Phenol	8250A	15	15

Table 1-5 (page 13) Organic Analytical Parameters and Estimated Detection Limits			
Compound	Method	Water (ug/L)	Soil (ug/Kg)
Phenol-d6 (surr.)	8250A	—	—
Phorate	8141A	0.4	20.0
Phorate	8140	1.5	100.5
Phorate	8270B	10.0	ND
Phosalone	8270B	100.0	ND
Phosmet	8270B	40.0	ND
Phosphamidon	8270B	100.0	ND
Phthalic anhydride	8270B	100.0	ND
Picloram	8151	0.14	—
Piperonyl sulfoxide	8270B	100.0	ND
Promecarb	8318	2.5	17
Pronamide	8270B	10.0	ND
Pronamide	8250A	—	—
Propionitrile	8240B	100.0	5000.0
Propoxur (Baygon)	8318	2.4	17
Propylthiouracil	8270B	100.0	ND
Pyrene	8310	2.7	180.9
Pyrene	8270B	10.0	660.0
Pyrene	8250A	19	1273
Pyridine	8270B	ND	ND
Resorcinol	8270B	100.0	ND
Ronnel	8141A	0.7	35.0
Ronnel	8140	3.0	201.0
Safrole	8270B	10.0	ND
Stirophos (Tetrachlorvinphos)	8140	50.0	3350.0
Strychnine	8270B	40.0	ND
Styrene	8021A	0.1	0.1
Styrene	8260A	0.2	0.2
Styrene	8240B	5.0	250.0
Sulfallate	8270B	10.0	ND
Sulfotep	8141A	0.7	35.0
TEPP	8141A	8.0	400.0
Terbufos	8270B	20.0	ND
Terphenyl-d14 (surr.)	8250A	—	—
Tetrachlorobenzenes	8120A	—	—
Tetrachloroethene	8010B	0.3	0.3
Tetrachloroethene	8021A	0.4	0.4
Tetrachloroethene	8260A	0.7	0.7
Tetrachloroethene	8240B	5.0	250.0
Tetrachlorophenols	8040A	—	—
Tetrachlorovinphos	8141A	8.0	400.0
Tetrachlorovinphos	8270B	20.0	ND
Tetraethyl pyrophosphate	8270B	40.0	ND
Thionazine	8270B	20.0	ND
Thiophenol (Benzenethiol)	8270B	20.0	ND
Tokuthion (Prothiofos)	8140	5.0	335.0
Tokuthion (Prothiofos)	8141A	0.7	55.0
Toluene	8021A	0.1	0.1
Toluene	8260A	0.6	0.6
Toluene	8020B	2.0	2.0
Toluene	8240B	5.0	250.0
Toluene diisocyanate	8270B	100.0	ND
Toxaphene	8080B	2.4	160.8
Toxaphene	8081	—	—
Toxaphene	8250A	—	—
Tri-p-tolyl phosphate(h)	8270B	10.0	ND

Table 1-5 (page 14)
Organic Analytical Parameters and
Estimated Detection Limits

Compound	Method	Water (ug/L)	Soil (ug/Kg)
Trichloroethene	8260A	1.0	1.0
Trichloroethene	8010B	1.2	1.2
Trichloroethene	8240B	5.0	250.0
Trichlorofluoromethane	8021A	0.3	0.3
Trichlorofluoromethane	8260A	0.4	0.4
Trichlorofluoromethane	8010B	-	-
Trichloronate	8140	1.5	100.5
Trichloronate	8141A	8.0	400.0
Trichlorophenols	8040A	-	-
Trifluralin	8270B	10.0	ND
Trimethyl phosphate	8270B	10.0	ND
Tris(2,3-dibromopropyl) phosphate	8270B	200.0	ND
Vinyl Chloride	8021A	0.2	0.2
Vinyl Chloride	8260A	0.9	0.9
Vinyl Chloride	8010B	1.8	1.8
Vinyl acetate	8240B	50.0	2500.0
Vinyl chloride	8240B	10.0	500.0
Xylene (Total)	8240B	5.0	250.0
Xylenes	8020B	-	-
a,a-Dimethylphenethylamine	8270B	-	ND
a-a-Dimethylphenethylamine	8250A	-	-
a-Naphthol	8318	-	-
alpha-BHC	8080B	0.03	2.0
alpha-BHC	8081	0.035	1.9
alpha-BHC	8250A	-	-
alpha-Chlordane	8081	0.008	-
alpha-BHC	8121	0.11	7.37
beta-BHC	8081	0.023	3.3
beta-BHC	8080B	0.06	4.0
beta-BHC	8250A	42	2814
beta-BHC	8121	0.31	20.77
cis-1,2-Dichloroethane	8021A	0.1	0.1
cis-1,2-Dichloroethane	8260A	0.6	0.6
cis-1,3-Dichloropropene	8260A	0.0	0.0
cis-1,3-Dichloropropene	8240B	5.0	250.0
cis-1,3-Dichloropropene	8010B	-	-
delta-BHC	8081	0.024	1.1
delta-BHC	8080B	0.09	6.0
delta-BHC	8250A	31	277
delta-BHC	8121	0.2	13.4
gamma-BHC	8080B	0.04	2.7
gamma-BHC (Lindane)	8081	0.025	2
gamma-Chlordane	8081	0.037	1.5
gamma-BHC	8250A	-	-
gamma-BHC	8121	0.23	15.41
1,2-Dibromo-3-chloropropane	8260A	1.3	1.3
1,3,5-Trimethylbenzene	8260A	0.3	0.3
m-Xylene	8021A	0.1	0.1
m-Xylene	8260A	0.3	0.3
n-Butylbenzene	8021A	0.2	0.2
n-Butylbenzene	8260A	0.6	0.6
n-Propylbenzene	8021A	0.04	0.04
n-Propylbenzene	8260A	0.2	0.2
o-Anisidine	8270B	10.0	ND
o-Toluidine	8270B	10.0	ND
o-Xylene	8021A	0.2	0.2
o-Xylene	8260A	0.6	0.6

Table 1-5 (page 15)
Organic Analytical Parameters and
Estimated Detection Limits

Compound	Method	Water (ug/L)	Soil (ug/Kg)
p-Cresidine	8270B	10.0	ND
p-Dimethylaminoazobenzene	8250A	—	—
p-Isopropyltoluene	8021A	0.1	0.1
p-Isopropyltoluene	8260A	0.6	0.6
p-Xylene	8021A	0.1	0.1
p-Xylene	8260A	0.7	0.7
sec-Butylbenzene	8021A	0.2	0.2
sec-Butylbenzene	8260A	0.7	0.7
tert-Butylbenzene	8021A	0.6	0.6
tert-Butylbenzene	8260A	0.7	0.7
trans-1,2-Dichloroethene	8260A	0.3	0.3
trans-1,2-Dichloroethene	8021A	0.5	0.5
trans-1,2-Dichloroethene	8010B	1.0	1.0
trans-1,2-Dichloroethene	8240B	5.0	250.0
trans-1,3-Dichloropropene	8260A	0.0	0.0
trans-1,3-Dichloropropene	8010B	3.4	3.4
trans-1,3-Dichloropropene	8240B	5.0	250.0

Table 1-6
Inorganic Analytical Parameters
and Estimated Detection Limits

Analyte	Method	Water mg/l	Soil mg/Kg
Aluminum	6010A	0.045	4.5
	6020	0.0001	0.01
	7020	0.1	10
Antimony	6010A	0.032	3.2
	6020	0.00002	0.002
	7040	0.2	20
	7041	0.003	0.3
Arsenic	6010A	0.053	5.3
	6020	0.004	0.4
	7060A	0.005	0.5
	7061A	0.001	0.1
Barium	6010A	0.002	0.2
	6020	0.00002	0.002
	7080A	0.1	10
	7081	0.002	0.2
Beryllium	6010A	0.0003	0.03
	6020	0.0001	0.01
	7090	0.005	0.5
	7091	0.0002	0.02
Cadmium	6010A	0.004	0.4
	6020	0.00007	0.007
	7130	0.005	0.5
	7130A	0.0001	0.01
Calcium	6010A	0.01	1
	7140	0.01	1
Chromium	6010A	0.007	0.7
	6020	0.00002	0.002
	7090	0.05	5
	7091	0.001	0.1
Cobalt	6010A	0.007	0.7
	6020	0.00001	0.001
	7200	0.05	5
	7201	0.001	0.1
Copper	6010A	0.006	0.6
	6020	0.00003	0.003
	7210	0.02	2
	7211	0.001	0.1
Iron	6010A	0.007	0.7
	7380	0.03	3
	7381	0.001	0.1
Lead	6010A	0.042	4.2
	6020	0.00002	0.002
	7420	0.1	10
	7421	0.001	0.1
Magnesium	6010A	0.03	3
	7450	0.001	0.1
Manganese	6010A	0.002	0.2
	6020	0.00004	0.04
	7460	0.01	1
Mercury	7461	0.0002	0.02
	7470A	0.0002	
Molybdenum	7471A		0.02
	6010A	0.008	0.8
	7480	0.1	10
	7481	0.001	0.1
Nickel	6010A	0.015	1.5

Table 1-6 (page 2)
Inorganic Analytical Parameters
and Estimated Detection Limits

Analyte	Method	Water µg/l	Soil mg/Kg
Nickel	7520	0.04	4
Potassium	7610	0.01	1
	6010A		
Selenium	6010A	0.075	7.5
	7740	0.002	0.2
	7741A		0
Silver	6010A	0.007	0.7
	6020	0.00004	0.004
	7760A	0.01	1
	7761	0.0002	0.02
Sodium	6010A	0.029	2.9
	7770	0.002	0.2
Strontium	6010A	0.0003	0.03
	7780	0.03	3
Thallium	6010A	0.04	4
	6020	0.00005	0.005
	7840	0.1	10
	7841	0.001	0.1
Tin	7870	0.8	80
Vanadium	6010A	0.008	0.8
	7910	0.2	20
	7911	0.004	0.4
Zinc	6010A	0.002	0.2
	6020	0.00008	0.008
	7950	0.005	0.5
	7951	0.00005	0.005
Cyanide	9010A	0.01	0.01
	9012A	0.01	0.01

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2.0 QUALITY ASSURANCE OBJECTIVES FOR MEASUREMENT DATA

The overall laboratory Quality Assurance objective of the Pre-Notice Site Cleanup Program (Program) is to establish minimum guidelines for laboratory analysis and reporting that will assure that all data will be scientifically valid and technically defensible for the purposes of making critical determinations or decisions during remedial activities. These decisions and determinations are divided into two categories. The categories are:

CATEGORY

- A. Identification of the classes of chemicals of concern and subsequent reduction of sampling and analytical requirements for site remedial response activities;
- B. Demonstration of the sufficiency of site characterizations and investigations; establishment of site cleanup objectives; and demonstration of attainment of site cleanup objectives and specific project objectives.

Meeting the laboratory Quality Assurance objectives for the two Categories of decisions and determinations in the Program requires two levels of quality for the laboratory analytical data. Both levels are variations on the Level III as defined in section 1.5 of this document. For the Program these are referred to as Levels III A and III B. Both of these levels has differing requirements for the performance and reporting of the analytical quality control procedures. The levels required to support the two Categories of decisions and determinations are defined as:

<u>CATEGORY</u>	<u>Level</u>
A	IIIA
B	IIIB

Specific procedures for laboratory instruments calibration, laboratory analysis, reporting of data, internal quality control, audits, preventive maintenance and corrective action for the two levels are described in other sections of this document. The purpose of this section is to address the specific objectives for accuracy, precision, completeness, representativeness, and comparability for the two levels of data.

2.1 DEFINITIONS OF PRECISION AND ACCURACY FOR THE PRE-NOTICE SITE CLEANUP PROGRAM

2.1.1 Precision

Precision measures the reproducibility of measurements under a given set of conditions. Specifically, it is a quantitative measure of the variability of a group of measurements compared to their average value. Precision is usually expressed in terms of standard deviation but other estimates such as the coefficient of variation (relative standard deviation), range (maximum value minus minimum value), and relative range are common.

2.1.2 Accuracy

Accuracy measures the ability of the analytical system to render accurate results under a given set of conditions. Accuracy may be expressed as the difference between the value of the reported data and the true value of the parameter being measured. Accuracy is usually stated in terms of percent recovery.

2.2 QUALITY CONTROL PROCEDURES USED TO ASSESS PRECISION AND ACCURACY

Trip blank, duplicate, matrix spike, and surrogate samples should be analyzed to assess the quality of the data resulting from the sampling and analysis program.

2.2.1 Accuracy

Analytical accuracy is assessed by performing surrogate spikes for each sample (organic analyses), matrix spikes on selected samples, and analyzing laboratory blanks, trip/travel blanks and known or blind reference samples. Additionally, initial, continuing and final equipment calibrations must be performed and accomplished within established limits to define the equipments' accuracy before analytical accuracy can be determined for any sample set.

Trip/travel blanks consisting of distilled water, should be submitted to the analytical laboratories to provide the means to assess the quality of the data resulting from the field sampling program. Trip/travel blanks are used to assess the potential for contamination of samples due to contaminant migration during sample bottle preparation, sample shipment, and storage.

2.2.2 Precision

Analytical precision is assessed by performing laboratory duplicate sample analysis. To assess precision for organic analyses all matrix spikes are performed in duplicate.

2.3 FREQUENCY OF QUALITY CONTROL PROCEDURES AND OBJECTIVES FOR PRECISION AND ACCURACY

Table 2-2 contains the precision and accuracy objectives for Level III A data used to support Category A decisions and determinations. The tables contain the precision and accuracy objectives arranged by analytical method.

Tables 2-3 through 2-58 contain the precision and accuracy objectives for Level III B used to support Category B decisions and determinations. The tables contain the precision and accuracy objectives arranged by analytical method.

Table 2-1 contains required minimum frequency for method blank, duplicate, matrix spike, and surrogate samples for Levels IIIA and IIIB data.

2.4 REPRESENTATIVENESS, COMPLETENESS AND COMPARABILITY

2.4.1 Representativeness

Representativeness expresses the degree to which sample data accurately represent the site, a specific matrix or parameter variations at a sampling point. Representativeness is a qualitative parameter which is dependent on both the proper design of the sampling program and proper laboratory protocol. The analytical representativeness criterion will be satisfied by making certain that proper analytical procedures are utilized, preservation requirements are met and holding times are not exceeded.

2.4.2 Completeness

Completeness is a measure of the amount of valid data obtained from a measurement system compared to the amount that was expected to be obtained under normal conditions.

Table 2-2 contains the completeness objectives for Level III A data used to support Category A decisions and determinations.

Tables 2-3 through 2-58 contain the completeness objectives for Level III B data used to support Category B decisions and determinations.

2.4.3 Comparability

Comparability expresses the confidence with which one data set can be compared to another. The extent to which existing and planned analytical data will be comparable depends on the similarity of sampling and analytical methods. The analytical procedures used to obtain the planned analytical data, as documented in this Analytical Quality Assurance Program, are expected to provide the Illinois EPA Pre-Notice Site Cleanup Program with comparable analytical data for all Pre-Notice sites. This comparability criteria applies only to the Level III B data used to support Category B decisions and determinations.

2.5 QA/QC Targets

Target values for detection limit, percent recoveries and percent "true" value of known check standards, and RPD of duplicate/replicates are provided in Sections 1 and 2 of this Analytical Quality Assurance Plan (AQAP). It is important to note that tabulated values may not be attainable. For example, high contaminant concentrations, sample nonhomogeneity, and matrix interferences can preclude achievement of target detection limits or other QC criteria. In such instances, the data report must contain a case narrative which must indicate the occurrence and cause of any deviation from the tabulated detection limits or any other noncompliance with specified QC criteria.

2.6 FAILURE TO MEET AGENCY QUALITY ASSURANCE OBJECTIVES

Failure to meet the Agency's quality assurance objectives for the Program may result in data

determination by the Agency. In the event that the laboratory believes that the Agency's Program quality assurance objectives can not be met due to sample matrix effects, the participant's Project Manager may request a change or modification of the Agency's Program quality assurance objectives from the Agency's Project Manager. Any such request must contain sufficient supporting documentation to allow the Agency's Division of Laboratories, Quality Assurance Section to review the request and advise the Agency's Project Manager of the validity of the request for change or modification of the Agency's Program quality assurance objectives. Appendix A of this AQAP contains copies of the necessary data reporting forms for reporting all Program data to the Agency and Section 6 contains the data reporting flags that must be used when reporting data to the Program. Section 6 contains the data reporting flags to be used for reporting both data that meets Program quality assurance objectives and data that fails Program quality assurance objectives.

The request for change or modification must indicate that the laboratory or the Program participant represents that due to insurmountable sample matrix affects on the analyses, the data are: 1) usable as a quantitative concentration, 2) usable with caution as an estimated concentration, or 3) unusable due to out-of-control QC results.

TABLE 2-1

Table 2-1 Laboratory Quality Control Frequencies					
	Levels	Method Blanks	Laboratory Duplicates	Matrix Spikes	Surrogates
Organic Parameters	III A	1 per matrix batch	1 per 20 or fewer samples	1 per 20 or fewer samples	Every Sample
	III B	1 per matrix batch Maximum batch size is 20 samples	1 per 10 or fewer samples per matrix	1 per 10 or fewer samples per matrix	Every Sample
Inorganic Parameters	III A	1 per matrix batch	1 per 20 or fewer samples	1 per 20 or fewer samples	None
	III B	1 per matrix batch Maximum batch size is 20 samples	1 per 10 or fewer samples per matrix	1 per 10 or fewer samples per matrix	None

- For organic parameters the analysis of Matrix Spike/Matrix Spike Duplicates fulfills the requirements for Laboratory Duplicates and Matrix Spikes

TABLE 2-2
Precision, Accuracy and Completeness
Level IIIA Objectives

Analyte	Method	Matrix	Precision (RPD) a	Accuracy (%Recovery) b	% Completeness
Volatile Organic Compounds	8260A	Aqueous	< 25%	50 - 150	80
Semi-Volatile Organic Compounds	8270B	Aqueous	<50%	25 - 150	80
Pesticides & PCBs	8081	Aqueous	<35%	25 - 150	80
Metals	6010A,7060A, 7061A,7062,7421, 7470A,7471A, 7841 & 9012	Aqueous	<25%	70 - 130	80

Volatile Organic Compounds	8260A	Solid	<30%	50 - 200	80
Semi-Volatile Organic Compounds	8270B	Solid	<60%	25 - 200	80
Pesticides & PCBs	8081	Solid	<60%	25 - 150	80
Metals	6010A,7060A, 7061A,7062,7421, 7470A,7471A, 7841 & 9012	Solid	<40%	60 - 140	80

a Relative Percent Difference of Duplicate Sample analyses

b Percent Recovery of Spike Sample analyses

TABLE 2-3
METHOD 8010B Aqueous - Level III B Objectives

COMPOUND	Precision (RPD) ^a	Accuracy (%Recovery) ^b	Completeness (%)
Bromodichloromethane	<15%	80-134	90%
Bromoform	<15%	72-125	90%
Bromomethane	<20%	57-125	90%
Carbon tetrachloride	<15%	70-127	90%
Chlorobenzene	<15%	75-128	90%
Chloroethane	<15%	75-128	90%
2-Chloroethyl vinyl ether	<20%	65-135	90%
Chloroform	<15%	75-130	90%
Chloromethane	<20%	50-139	90%
Dibromochloromethane	<15%	72-122	90%
1,2-Dichlorobenzene	<15%	76-123	90%
1,3-Dichlorobenzene	<20%	68-132	90%
1,4-Dichlorobenzene	<15%	75-122	90%
1,1-Dichloroethane	<15%	79-119	90%
1,2-Dichloroethane	<15%	80-120	90%
1,1-Dichloroethene	<20%	69-125	90%
trans-1,2-Dichloroethene	<15%	79-125	90%
Dichloromethane	<15%	70-130	90%
1,2-Dichloropropane	<15%	77-123	90%
cis-1,3-Dichloropropene	<20%	68-132	90%
trans-1,3-Dichloropropene	<15%	68-132	90%
1,1,2,2-Tetrachloroethane	<15%	70-130	90%
Tetrachloroethene	<15%	75-123	90%
1,1,1-Trichloroethane	<15%	72-128	90%
1,1,2-Trichloroethane	<15%	67-123	90%
Trichloroethene	<15%	68-128	90%
Trichlorofluoromethane	<15%	65-123	90%
Vinyl Chloride	<25%	70-128	90%

TABLE 2-4
METHOD 8010B Solids Level III B Objectives

Compound	Precision (RPD) ^a	Accuracy (%Recovery) ^b	Completeness (%)
Bromodichloromethane	<25%	70-140	90%
Bromoform	<25%	60-125	90%
Bromomethane	<25%	40-140	90%
Carbon tetrachloride	<25%	60-140	90%
Chlorobenzene	<25%	70-130	90%
Chloroethane	<25%	70-130	90%
2-Chloroethyl vinyl ether	<25%	50-140	90%
Chloroform	<25%	60-120	90%
Chloromethane	<25%	30-140	90%
Dibromochloromethane	<25%	60-130	90%
1,2-Dichlorobenzene	<25%	65-125	90%
1,3-Dichlorobenzene	<25%	60-130	90%
1,4-Dichlorobenzene	<25%	65-125	90%
1,1-Dichloroethane	<25%	65-125	90%
1,2-Dichloroethane	<25%	70-130	90%
1,1-Dichloroethene	<25%	60-140	90%
trans-1,2-Dichloroethene	<25%	70-125	90%
Dichloromethane	<25%	60-125	90%
1,2-Dichloropropane	<25%	65-140	90%
cis-1,3-Dichloropropene	<25%	60-150	90%
trans-1,3-Dichloropropene	<25%	60-150	90%
1,1,2,2-Tetrachloroethane	<25%	60-125	90%
Tetrachloroethene	<25%	65-120	90%
1,1,1-Trichloroethane	<25%	65-120	90%
1,1,2-Trichloroethane	<25%	60-120	90%
Trichloroethene	<25%	60-120	90%
Trichlorofluoromethane	<25%	60-120	90%
Vinyl Chloride	<25%	60-140	90%

TABLE 2-5 METHOD 8011 Aqueous Level III B Objectives			
Compound	Precision (RPD)a	Accuracy (% Recovery)b	Completeness (%)
1,2-Dibromo-3-chloropropane (DBCP)	<15%	80-120	90%
1,2-Dibromoethane (EDB)	<15%	80-120	90%

TABLE 2-6 METHOD 8011 Solids Level III B Objectives			
Compound	Precision (RPD)a	Accuracy (% Recovery)b	Completeness (%)
1,2-Dibromo-3-chloropropane (DBCP)	<20%	75-125	90%
1,2-Dibromoethane (EDB)	<20%	75-125	90%

TABLE 2-7 METHOD 8015A Aqueous Level III B Objectives			
Compound	Precision (RPD)a	Accuracy (% Recovery)b	Completeness (%)
Diethyl ether	<20%	70-130	90%
Ethanol	<20%	70-130	90%
Methyl ethyl ketone (MEK)	<20%	70-130	90%
Methyl isobutyl ketone (MIBK)	<20%	70-130	90%

TABLE 2-8 METHOD 8015A Solids Level III B Objectives			
Compound	Precision (RPD)a	Accuracy (% Recovery)b	Completeness (%)
Diethyl ether	<30%	55-145	90%
Ethanol	<30%	55-145	90%
Methyl ethyl ketone (MEK)	<30%	55-145	90%
Methyl isobutyl ketone (MIBK)	<30%	55-145	90%

TABLE 2-9 METHOD 8020A Aqueous Level III B Objectives			
COMPOUND	Precision (RPD)a	Accuracy (% Recovery)b	Completeness (%)
Benzene	< 10%	84-115	90%
Chlorobenzene	< 10%	75-115	90%
1,2-Dichlorobenzene	< 15%	78-115	90%
1,3-Dichlorobenzene	< 10%	82-115	90%
1,4-Dichlorobenzene	< 10%	80-115	90%
Ethyl Benzene	< 10%	78-115	90%
Toluene	< 10%	85-115	90%

- a Relative Percent Difference of Duplicate Sample analyses
b Percent Recovery of Spike Sample analyses

TABLE 2-10
METHOD 8020A Solids Level III B Objectives

COMPOUND	Precision (RPD) ^a	Accuracy (% Recovery) ^b	Completeness (%)
Benzene	< 20%	75-125	90%
Chlorobenzene	< 20%	75-125	90%
1,2-Dichlorobenzene	< 20%	75-125	90%
1,3-Dichlorobenzene	< 20%	75-125	90%
1,4-Dichlorobenzene	< 20%	75-125	90%
Ethyl Benzene	< 20%	75-125	90%
Toluene	< 20%	75-125	90%

TABLE 2-11
METHOD 8021A Aqueous Level III B Objectives

COMPOUND	Precision (RPD) ^a	Accuracy (% Recovery) ^b	Completeness (%)
Benzene	< 20%	80-120	90%
Bromobenzene	< 20%	80-120	90%
Bromochloromethane	< 20%	80-120	90%
Bromodichloromethane	< 20%	80-120	90%
Bromoform	< 20%	80-120	90%
Bromomethane	< 20%	80-120	90%
n-Butylbenzene	< 20%	80-120	90%
sec-Butylbenzene	< 20%	80-120	90%
tert-Butylbenzene	< 20%	80-120	90%
Carbon Tetrachloride	< 20%	80-120	90%
Chlorobenzene	< 20%	80-120	90%
Chlorodibromomethane	< 20%	80-120	90%
Chloroethane	< 20%	80-120	90%
Chloroform	< 20%	80-120	90%
Chloromethane	< 20%	69-123	90%
2-Chlorotoluene	< 20%	80-120	90%
4-Chlorotoluene	< 20%	80-120	90%
1,2-Dibromo-3-Chloropropane	< 20%	60-120	90%
1,2-Dibromoethane	< 20%	80-120	90%
Dibromomethane	< 20%	80-120	90%
1,2-Dichlorobenzene	< 20%	80-120	90%
1,3-Dichlorobenzene	< 20%	80-120	90%
1,4-Dichlorobenzene	< 20%	80-120	90%
Dichlorodibromomethane	< 20%	71-110	90%
1,1-Dichloroethane	< 20%	80-120	90%
1,2-Dichloroethane	< 20%	80-120	90%
1,1-Dichlorobenzene	< 20%	80-120	90%
cis-1,2-Dichloroethane	< 20%	80-120	90%
trans-1,2-Dichloroethane	< 20%	80-120	90%
1,2-Dichloropropane	< 20%	80-120	90%
1,3-Dichloropropane	< 20%	80-120	90%
2,2-Dichloropropane	< 20%	80-120	90%
1,1-Dichloropropene	< 20%	80-120	90%
cis-1,3-dichloropropene	< 20%	80-120	90%
trans-1,3-dichloropropene	< 20%	80-120	90%
Ethylbenzene	< 20%	80-120	90%
Hexachlorobutadiene	< 20%	70-128	90%
Isopropylbenzene	< 20%	80-120	90%
p-Isopropyltoluene	< 20%	80-120	90%
Methylene Chloride	< 20%	80-120	90%
Naphthalene	< 20%	80-120	90%

TABLE 2-11
METHOD 8021A Aqueous Level III B Objectives

COMPOUND	Precision (RPD) ^a	Accuracy (% Recovery) ^b	Completeness (%)
n-Propylbenzene	< 20%	80-120	90%
Styrene	< 20%	80-120	90%
1,1,1,2-Tetrachloroethane	< 20%	80-120	90%
1,1,2,2-Tetrachloroethane	< 20%	80-120	90%
Tetrachloroethene	< 20%	80-120	90%
Toluene	< 20%	80-120	90%
1,2,3-Trichlorobenzene	< 20%	80-120	90%
1,2,4-Trichlorobenzene	< 20%	80-120	90%
1,1,1-Trichloroethane	< 20%	80-120	90%
1,1,2-Trichloroethane	< 20%	80-120	90%
Trichloroethene	< 20%	80-120	90%
Trichlorofluoromethane	< 20%	80-120	90%
1,2,3-Trichloropropane	< 20%	80-120	90%
1,2,4-Trimethylbenzene	< 20%	80-120	90%
1,3,5-Trimethylbenzene	< 20%	80-120	90%
Vinyl Chloride	< 20%	80-120	90%
o-Xylene	< 20%	80-120	90%
m-Xylene	< 20%	80-120	90%
p-Xylene	< 20%	80-120	90%

TABLE 2-12
METHOD 8021A Solids Level III B Objectives

COMPOUND	Precision (RPD) ^a	Accuracy (% Recovery) ^b	Completeness (%)
Benzene	< 20%	75-125	90%
Bromobenzene	< 20%	75-125	90%
Bromochloromethane	< 20%	75-125	90%
Bromodichloromethane	< 20%	75-125	90%
Bromoform	< 20%	75-125	90%
Bromomethane	< 20%	75-125	90%
n-Butylbenzene	< 20%	75-125	90%
sec-Butylbenzene	< 20%	75-125	90%
tert-Butylbenzene	< 20%	75-125	90%
Carbon Tetrachloride	< 20%	75-125	90%
Chlorobenzene	< 20%	75-125	90%
Chlorodibromomethane	< 20%	75-125	90%
Chloroethane	< 20%	75-125	90%
Chloroform	< 20%	75-125	90%
Chloromethane	< 20%	75-125	90%
2-Chlorotoluene	< 20%	75-125	90%
4-Chlorotoluene	< 20%	75-125	90%
1,2-Dibromo-3-Chloropropane	< 20%	75-125	90%
1,2-Dibromoethane	< 20%	75-125	90%
Dibromomethane	< 20%	75-125	90%
1,2-Dichlorobenzene	< 20%	75-125	90%
1,3-Dichlorobenzene	< 20%	75-125	90%
1,4-Dichlorobenzene	< 20%	75-125	90%
Dichlorodifluoromethane	< 20%	75-125	90%
1,1-Dichloroethane	< 20%	75-125	90%
1,2-Dichloroethane	< 20%	75-125	90%
1,1-Dichloroethene	< 20%	75-125	90%
cis-1,2-Dichloroethane	< 20%	75-125	90%
trans-1,2-Dichloroethane	< 20%	75-125	90%
1,2-Dichloropropane	< 20%	75-125	90%

TABLE 2-12 METHOD 8021A Solids Level III B Objectives			
COMPOUND	Precision (RPD) ^a	Accuracy (% Recovery) ^b	Completeness (%)
2,2-Dichloropropane	< 20%	75-125	90%
1,1-Dichloropropene	< 20%	75-125	90%
cis-1,3-dichloropropene	< 20%	75-125	90%
trans-1,3-dichloropropene	< 20%	75-125	90%
Ethylbenzene	< 20%	75-125	90%
Hexachlorobutadiene	< 20%	75-125	90%
Isopropylbenzene	< 20%	75-125	90%
p-Isopropyltoluene	< 20%	75-125	90%
Methylene Chloride	< 20%	75-125	90%
Naphthalene	< 20%	75-125	90%
n-Propylbenzene	< 20%	75-125	90%
Styrene	< 20%	75-125	90%
1,1,1,2-Tetrachloroethane	< 20%	75-125	90%
1,1,2,2-Tetrachloroethane	< 20%	75-125	90%
Tetrachloroethene	< 20%	75-125	90%
Toluene	< 20%	75-125	90%
1,2,3-Trichlorobenzene	< 20%	75-125	90%
1,2,4-Trichlorobenzene	< 20%	75-125	90%
1,1,1-Trichloroethane	< 20%	75-125	90%
1,1,2-Trichloroethane	< 20%	75-125	90%
Trichloroethene	< 20%	75-125	90%
Trichlorofluoromethane	< 20%	75-125	90%
1,2,3-Trichloropropane	< 20%	75-125	90%
1,2,4-Trimethylbenzene	< 20%	75-125	90%
1,3,5-Trimethylbenzene	< 20%	75-125	90%
Vinyl Chloride	< 20%	75-125	90%
o-Xylene	< 20%	75-125	90%
m-Xylene	< 20%	75-125	90%
p-Xylene	< 20%	75-125	90%

TABLE 2-13 METHOD 8030A Aqueous Level III B Objectives			
COMPOUND	Precision (RPD) ^a	Accuracy (% Recovery) ^b	Completeness (%)
Acrolein	< 20%	84-110	90%
Acrylonitrile	< 20%	88-112	90%

TABLE 2-14 METHOD 8030A Solids Level III B Objectives			
COMPOUND	Precision (RPD) ^a	Accuracy (% Recovery) ^b	Completeness (%)
Acrolein	< 30%	75-125	90%
Acrylonitrile	< 30%	75-125	90%

TABLE 2-15 METHOD 8031 Aqueous Level III B Objectives			
COMPOUND	Precision (RPD) ^a	Accuracy (% Recovery) ^b	Completeness (%)
Acrylonitrile	< 15%	75-125	90%

TABLE 2-16 METHOD 8031 Solids Level III B Objectives			
COMPOUND	Precision (RPD) ^a	Accuracy (% Recovery) ^b	Completeness (%)
Acrylonitrile	< 30%	65-135	90%

TABLE 2-17 METHOD 8032 Aqueous Level III B Objectives			
COMPOUND	Precision (RPD) ^a	Accuracy (% Recovery) ^b	Completeness (%)
Acrylamide	< 15%	75-125	90%

TABLE 2-18 METHOD 8032 Solids Level III B Objectives			
COMPOUND	Precision (RPD) ^a	Accuracy (% Recovery) ^b	Completeness (%)
Acrylamide	< 30%	65-135	90%

TABLE 2-19 METHOD 8040A Aqueous Level III B Objectives			
COMPOUND	Precision (RPD) ^a	Accuracy (% Recovery) ^b	Completeness (%)
2,4,6-Trichlorophenol	< 20%	75-125	90%
2,4-Dichlorophenol	< 20%	70-125	90%
2,4-Dimethylphenol	< 20%	60-125	90%
2,4-Dinitrophenol	< 20%	60-125	90%
2,6-Dichlorophenol	< 20%	65-125	90%
2-Chlorophenol	< 20%	65-125	90%
2-Cyclohexyl-4,6-dinitrophenol	< 20%	60-125	90%
2-Methyl-4,6-dinitrophenol	< 20%	65-125	90%
2-Nitrophenol	< 20%	70-125	90%
2-sec-Butyl-4,6-dinitrophenol	< 20%	65-125	90%
4-Chloro-3-methylphenol	< 20%	75-125	90%
4-Nitrophenol	< 20%	50-125	90%
Cresols (methyl phenol)	< 20%	60-125	90%
Pentachlorophenol	< 20%	65-125	90%
Phenol	< 20%	50-125	90%
Tetrachlorophenols	< 20%	65-125	90%
Trichlorophenols	< 20%	65-125	90%

TABLE 2-20 METHOD 8040A Solids Level III B Objectives			
COMPOUND	Precision (RPD) ^a	Accuracy (% Recovery) ^b	Completeness (%)
2,4,6-Trichlorophenol	< 25%	50-120	90%
2,4-Dichlorophenol	< 25%	50-120	90%
2,4-Dimethylphenol	< 25%	45-120	90%
2,4-Dinitrophenol	< 25%	50-120	90%
2,6-Dichlorophenol	< 25%	50-120	90%
2-Chlorophenol	< 25%	50-120	90%
2-Cyclohexyl-4,6-dinitrophenol	< 25%	50-120	90%
2-Methyl-4,6-dinitrophenol	< 25%	50-120	90%
2-Nitrophenol	< 25%	50-120	90%
2-sec-Butyl-4,6-dinitrophenol	< 25%	50-120	90%
4-Chloro-3-methylphenol	< 25%	60-120	90%
4-Nitrophenol	< 25%	45-120	90%
Cresols (methyl phenol)	< 25%	50-120	90%
Pentachlorophenol	< 25%	50-120	90%
Phenol	< 25%	45-120	90%
Tetrachlorophenols	< 25%	50-120	90%
Trichlorophenols	< 25%	50-120	90%

TABLE 2-21 METHOD 8060 Aqueous Level III B Objectives			
Compound	Precision (RPD) ^a	Accuracy (%Recovery) ^b	Completeness (%)
Benzyl butyl phthalate	<20%	65-110	90%
Bis(2-ethylhexyl) phthalate	<20%	50-110	90%
Di-n-butyl phthalate	<20%	65-110	90%
Di-n-octyl phthalate	<20%	50-110	90%
Diethyl phthalate	<20%	55-110	90%
Dimethyl phthalate	<20%	65-110	90%

TABLE 2-22 METHOD 8060 Solids Level III B Objectives			
	Precision (RPD) ^a	Accuracy (%Recovery) ^b	Completeness (%)
Benzyl butyl phthalate	<25%	55-120	90%
Bis(2-ethylhexyl) phthalate	<25%	55-120	90%
Di-n-butyl phthalate	<25%	55-120	90%
Di-n-octyl phthalate	<25%	55-120	90%
Diethyl phthalate	<25%	55-120	90%
Dimethyl phthalate	<25%	55-120	90%

TABLE 2-23 METHOD 8061 Aqueous Level III B Objectives			
Compound	Precision (RPD) ^a	Accuracy (%Recovery) ^b	Completeness (%)
Bis(2-n-butoxyethyl) phthalate	<20%	78-110	90%
Bis(2-ethoxyethyl) phthalate	<20%	70-110	90%
Bis(2-ethylhexyl) phthalate	<20%	75-110	90%
Bis(2-methoxyethyl) phthalate	<20%	70-110	90%
Bis(4-methyl-2-pentyl) phthalate	<20%	60-130	90%
Butyl benzyl phthalate	<20%	72-110	90%
Diamyl phthalate	<20%	65-112	90%
Di-n-butyl phthalate	<20%	60-125	90%
Dicyclohexyl phthalate	<20%	50-135	90%
Diethyl phthalate	<20%	60-135	90%
Dihexyl phthalate	<20%	68-115	90%
Diisobutyl phthalate	<20%	60-140	90%
Dimethyl phthalate	<20%	65-115	90%
Dinonyl phthalate	<20%	60-125	90%
Di-n-octyl phthalate	<20%	76-115	90%
Hexyl 2-ethylhexyl phthalate	<20%	60-135	90%

- ^a Relative Percent Difference of Duplicate Sample analyses
^b Percent Recovery of Spike Sample analyses

TABLE 2-24 METHOD 8061 Solids Level III B Objectives			
Compound	Precision (RPD) ^a	Accuracy (%Recovery) ^b	Completeness (%)
Bis(2-n-butoxyethyl) phthalate	<30%	60-140	90%
Bis(2-ethoxyethyl) phthalate	<30%	60-140	90%
Bis(2-ethylhexyl) phthalate	<30%	65-140	90%
Bis(2-methoxyethyl) phthalate	<30%	50-150	90%
Bis(4-methyl-2-pentyl) phthalate	<30%	55-130	90%
Butyl benzyl phthalate	<30%	60-140	90%
Diamyl phthalate	<30%	55-140	90%
Di-n-butyl phthalate	<30%	65-140	90%
Dicyclohexyl phthalate	<30%	55-150	90%
Diethyl phthalate	<30%	55-150	90%
Dihexyl phthalate	<30%	70-130	90%
Diisobutyl phthalate	<30%	75-130	90%
Dimethyl phthalate	<30%	65-135	90%
Dinonyl phthalate	<30%	75-130	90%
Di-n-octyl phthalate	<30%	75-140	90%
Hexyl 2-ethylhexyl phthalate	<30%	60-140	90%

TABLE 2-25 METHOD 8070 Aqueous Level III B Objectives			
Compound	Precision (RPD) ^a	Accuracy (%Recovery) ^b	Completeness (%)
N-Nitrosodi-n-propylamine	<20%	40-120	90%
N-Nitrosodimethylamine	<20%	65-120	90%
N-Nitrosodiphenylamine	<20%	60-120	90%

TABLE 2-26 METHOD 8070 Solids Level III B Objectives			
Compound	Precision (RPD) ^a	Accuracy (%Recovery) ^b	Completeness (%)
N-Nitrosodi-n-propylamine	<25%	50-120	90%
N-Nitrosodimethylamine	<25%	60-120	90%
N-Nitrosodiphenylamine	<25%	60-120	90%

- a Relative Percent Difference of Duplicate Sample analyses
b Percent Recovery of Spike Sample analyses

TABLE 2-27
METHOD 8080B/8081 Aqueous Level III B Objectives

Compound	Precision (RPD) ^a	Accuracy (%Recovery) ^b	Completeness (%)
4,4'-DDE	<20%	65-110	90%
4,4'-DDT	<20%	70-120	90%
4,4'-DDD	<20%	65-110	90%
Aldrin	<20%	70-110	90%
Chlordane (technical)	<20%	70-110	90%
Dieldrin	<20%	75-110	90%
Endosulfan I	<20%	80-115	90%
Endosulfan II	<20%	60-138	90%
Endosulfan sulfate	<20%	70-111	90%
Endrin	<20%	70-111	90%
Endrin aldehyde	<20%	60-115	90%
Heptachlor	<20%	65-110	90%
Heptachlor epoxide	<20%	70-112	90%
Methoxychlor	<20%	70-115	90%
PCB-1016	<20%	70-110	90%
PCB-1221	<20%	65-130	90%
PCB-1232	<20%	65-120	90%
PCB-1242	<20%	65-120	90%
PCB-1248	<20%	65-120	90%
PCB-1254	<20%	65-120	90%
PCB-1260	<20%	65-120	90%
Toxaphene	<20%	70-120	90%
alpha-BHC	<20%	70-110	90%
beta-BHC	<20%	65-110	90%
delta-BHC	<20%	70-110	90%
gamma-BHC	<20%	70-110	90%

^a Relative Percent Difference of Duplicate Sample analyses

^b Percent Recovery of Spike Sample analyses



TABLE 2-28
METHOD 8080B/8081 Solids Level III B Objectives

Compound	Precision (RPD) ^a	Accuracy (%Recovery) ^b	Completeness (%)
4,4'-DDE	<25%	60-135	90%
4,4'-DDT	<25%	65-135	90%
4,4'-DDD	<25%	60-135	90%
Aldrin	<25%	65-135	90%
Chlordane (technical)	<25%	70-135	90%
Dieldrin	<25%	70-135	90%
Endosulfan I	<25%	75-135	90%
Endosulfan II	<25%	55-140	90%
Endosulfan sulfate	<25%	70-135	90%
Endrin	<25%	70-135	90%
Endrin aldehyde	<25%	55-140	90%
Heptachlor	<25%	60-135	90%
Heptachlor epoxide	<25%	70-135	90%
Methoxychlor	<25%	70-135	90%
PCB-1016	<25%	70-135	90%
PCB-1221	<25%	60-135	90%
PCB-1232	<25%	60-135	90%
PCB-1242	<25%	60-135	90%
PCB-1248	<25%	60-135	90%
PCB-1254	<25%	60-135	90%
PCB-1270	<25%	60-135	90%
Toxaphene	<25%	70-135	90%
alpha-BHC	<25%	70-135	90%
beta-BHC	<25%	70-135	90%
delta-BHC	<25%	70-135	90%
gamma-BHC	<25%	70-135	90%

a Relative Percent Difference of Duplicate Sample analyses

b Percent Recovery of Spike Sample analyses

TABLE 2-29 METHOD 8090 Aqueous Level III B Objectives			
Compound	Precision (RPD) ^a	Accuracy (% Recovery)	Completeness (%)
2,4-Dinitrotoluene	<20%	60-120	90%
2,6-Dinitrotoluene	<20%	60-120	90%
Isophorone	<20%	60-120	90%
Nitrobenzene	<20%	60-120	90%

TABLE 2-30 METHOD 8090 Solids Level III B Objectives			
Compound	Precision (RPD) ^a	Accuracy (% Recovery)	Completeness (%)
2,4-Dinitrotoluene	<30%	60-120	90%
2,6-Dinitrotoluene	<30%	60-120	90%
Isophorone	<30%	60-120	90%
Nitrobenzene	<30%	60-120	90%

TABLE 2-31 METHOD 8110 Aqueous Level III B Objectives			
Compound	Precision (RPD) ^a	Accuracy (% Recovery)	Completeness (%)
4-Bromophenyl phenyl ether	<20%	70-120	90%
4-Chlorophenyl phenyl ether	<20%	65-120	90%
Bis(2-chloroethoxy) methane	<20%	65-120	90%
Bis(2-chloroethyl) ether	<20%	65-120	90%
Bis(2-chloroisopropyl) ether	<20%	65-120	90%

TABLE 2-32 METHOD 8110 Solids Level III B Objectives			
Compound	Precision (RPD) ^a	Accuracy (% Recovery)	Completeness (%)
4-Bromophenyl phenyl ether	<30%	60-140	90%
4-Chlorophenyl phenyl ether	<30%	60-140	90%
Bis(2-chloroethoxy) methane	<30%	60-140	90%
Bis(2-chloroethyl) ether	<30%	60-140	90%
Bis(2-chloroisopropyl) ether	<30%	60-140	90%

TABLE 2-33 METHOD 8120A Aqueous Level III B Objectives			
Compound	Precision (RPD) ^a	Accuracy (% Recovery) ^b	Completeness (%)
1,2,4-Trichlorobenzene	<20%	75-110	90%
1,2-Dichlorobenzene	<20%	75-110	90%
1,3-Dichlorobenzene	<20%	75-110	90%
1,4-Dichlorobenzene	<20%	75-110	90%
2-Chloronaphthalene	<20%	75-110	90%
Hexachlorobenzene	<20%	75-110	90%
Hexachlorobutadiene	<20%	75-110	90%
Hexachlorocyclopentadiene	<20%	75-110	90%
Hexachloroethane	<20%	75-110	90%

TABLE 2-34 METHOD 8120A Solids Level III B Objectives			
Compound	Precision (RPD) ^a	Accuracy (%Recovery) ^b	Completeness (%)
1,2,4-Trichlorobenzene	<25%	70-150	90%
1,2-Dichlorobenzene	<25%	70-150	90%
1,3-Dichlorobenzene	<25%	70-150	90%
1,4-Dichlorobenzene	<25%	70-150	90%
2-Chloronaphthalene	<25%	70-150	90%
Hexachlorobenzene	<25%	70-150	90%
Hexachlorobutadiene	<25%	70-150	90%
Hexachlorocyclopentadiene	<25%	70-150	90%
Hexachloroethane	<25%	70-150	90%

TABLE 2-35 METHOD 8121 Aqueous Level IIIB Objectives			
Compound	Precision (RPD) ^a	Accuracy (%Recovery) ^b	Completeness (%)
Benzal chloride	<25%	70-135	90%
Benzotrichloride	<25%	70-135	90%
Benzyl chloride	<25%	70-135	90%
2-Chloronaphthalene	<25%	70-135	90%
1,2-Dichlorobenzene	<25%	70-135	90%
1,3-Dichlorobenzene	<25%	70-135	90%
1,4-Dichlorobenzene	<25%	70-135	90%
Hexachlorobenzene	<25%	70-135	90%
Hexachlorobutadiene	<25%	70-135	90%
alpha-BHC	<25%	70-135	90%
beta-BHC	<25%	70-135	90%
gamma-BHC	<25%	70-135	90%
delta-BHC	<25%	70-135	90%
Hexachlorocyclopentadiene	<25%	70-135	90%
Hexachloroethane	<25%	70-135	90%
Pentachlorobenzene	<25%	70-135	90%
1,2,3,4-Tetrachlorobenzene	<25%	70-135	90%
1,2,4,5-Tetrachlorobenzene	<25%	70-135	90%
1,2,3,5-Tetrachlorobenzene	<25%	70-135	90%
1,2,4-Trichlorobenzene	<25%	70-135	90%
1,2,3-Trichlorobenzene	<25%	70-135	90%
1,3,5-Trichlorobenzene	<25%	70-135	90%
a,2,6-Trichlorotoluene	<25%	70-135	90%
1,4-Dichloronaphthalene	<25%	70-135	90%
2,3,4,5,6-Pentachlorotoluene	<25%	70-135	90%

- a Relative Percent Difference of Duplicate Sample analyses
b Percent Recovery of Spike Sample analyses

TABLE 2-36
METHOD 8121 Solid Level IIB Objectives

Compound	Precision (RPD) ^a	Accuracy (%Recovery) ^b	Completeness (%)
Benzal chloride	<25%	70-135	90%
Benzotrichloride	<25%	70-135	90%
Benzyl chloride	<25%	70-135	90%
2-Chloronaphthalene	<25%	70-135	90%
1,2-Dichlorobenzene	<25%	70-135	90%
1,3-Dichlorobenzene	<25%	70-135	90%
1,4-Dichlorobenzene	<25%	70-135	90%
Hexachlorobenzene	<25%	70-135	90%
Hexachlorobutadiene	<25%	70-135	90%
alpha-BHC	<25%	70-135	90%
beta-BHC	<25%	70-135	90%
gamma-BHC	<25%	70-135	90%
delta-BHC	<25%	70-135	90%
Hexachlorocyclopentadiene	<25%	70-135	90%
Hexachloroethane	<25%	70-135	90%
Pentachlorobenzene	<25%	70-135	90%
1,2,3,4-Tetrachlorobenzene	<25%	70-135	90%
1,2,4,5-Tetrachlorobenzene	<25%	70-135	90%
1,2,3,5-Tetrachlorobenzene	<25%	70-135	90%
1,2,4-Trichlorobenzene	<25%	70-135	90%
1,2,3-Trichlorobenzene	<25%	70-135	90%
1,3,5-Trichlorobenzene	<25%	70-135	90%
a,2,6-Trichlorotoluene	<25%	70-135	90%
1,4-Dichloronaphthalene	<25%	70-135	90%
2,3,4,5,6-Pentachlorotoluene	<25%	70-135	90%

- a Relative Percent Difference of Duplicate Sample analyses
b Percent Recovery of Spike Sample analyses

TABLE 2-37
METHOD 8140 Aqueous Level III B Objectives

Compound	Precision (RPD) ^a	Accuracy (%Recovery) ^b	Completeness (%)
Azinphos methyl	<25%	60-130	90%
Bolstar	<25%	60-120	90%
Chlorpyrifos	<25%	80-115	90%
Coumaphos	<25%	75-147	90%
Demeton-0	<25%	60-120	90%
Demeton-S	<25%	60-120	90%
Diazinon	<25%	60-120	90%
Dichlorvos	<25%	65-120	90%
Disulfoton	<25%	65-120	90%
Ethoprop	<25%	85-115	90%
Fensulfothion	<25%	60-145	90%
Fenthion	<25%	60-120	90%
Merphos	<25%	75-125	90%
Mevinphos	<25%	60-120	90%
Naled	<25%	60-120	90%
Parathion methyl	<25%	80-120	90%
Phorate	<25%	60-120	90%
Ronnel	<25%	80-120	90%
Stirophos (Tetrachlorvinphos)	<25%	60-120	90%
Tokuthion (Prothiofos)	<25%	60-120	90%
Trichloronate	<25%	60-150	90%

TABLE 2-38
METHOD 8140 Solids Level III B Objectives

Compound	Precision (RPD) ^a	Accuracy (%Recovery) ^b	Completeness (%)
Azinphos methyl	<30%	30-130	90%
Bolstar	<30%	60-140	90%
Chlorpyrifos	<30%	65-140	90%
Coumaphos	<30%	65-140	90%
Demeton-0	<30%	60-140	90%
Demeton-S	<30%	60-140	90%
Diazinon	<30%	60-140	90%
Dichlorvos	<30%	65-140	90%
Disulfoton	<30%	60-140	90%
Ethoprop	<30%	75-140	90%
Fensulfothion	<30%	60-140	90%
Fenthion	<30%	60-140	90%
Merphos	<30%	75-140	90%
Mevinphos	<30%	60-140	90%
Naled	<30%	60-140	90%
Parathion methyl	<30%	75-140	90%
Phorate	<30%	60-140	90%
Ronnel	<30%	75-140	90%
Stirophos (Tetrachlorvinphos)	<30%	60-140	90%
Tokuthion (Prothiofos)	<30%	60-140	90%
Trichloronate	<30%	60-140	90%

^a Relative Percent Difference of Duplicate Sample analyses
^b Percent Recovery of Spike Sample analyses

TABLE 2-39
METHOD 8141A Aqueous Level III B Objectives

Compound	Precision (RPD) ^a	Accuracy (%Recovery) ^b	Completeness (%)
Azinphos methyl	<20%	60-140	90%
Bolstar (Sulprofos)	<20%	60-140	90%
Chlorpyrifos	<20%	60-140	90%
Coumaphos	<20%	75-125	90%
Demeton, O, S	<20%	60-140	90%
Diazinon	<20%	70-140	90%
Dichlorvos	<20%	70-130	90%
Dimethoate	<20%	60-140	90%
Disulfoton	<20%	75-125	90%
EPN	<20%	75-125	90%
Ethoprop	<20%	75-125	90%
Fensulfothion	<20%	70-130	90%
Fenthion	<20%	60-140	90%
Malathion	<20%	80-120	90%
Merphos	<20%	70-130	90%
Mevinphos	<20%	60-140	90%
Monocrotophos	<20%	60-140	90%
Naled	<20%	60-140	90%
Parathion-ethyl	<20%	80-120	90%
Parathion-methyl	<20%	60-140	90%
Phorate	<20%	75-125	90%
Ronnel	<20%	75-125	90%
Sulfotep	<20%	75-125	90%
TEPP	<20%	60-140	90%
Tetrachlorovinphos	<20%	75-125	90%
Tokuthion (Protothiofos)	<20%	60-140	90%
Trichloronate	<20%	60-140	90%

TABLE 2-39

TABLE 2-40
METHOD 8141A Solids Level III B Objectives

Compound	Precision (RPD) ^a	Accuracy (%Recovery) ^b	Completeness (%)
Azinphos methyl	<25%	60-140	90%
Boistar (Sulprofos)	<25%	60-140	90%
Chlorpyrifos	<25%	60-140	90%
Coumaphos	<25%	65-135	90%
Demeton, O, S	<25%	60-140	90%
Diazinon	<25%	60-140	90%
Dichlorvos	<25%	50-140	90%
Dimethoate	<25%	60-140	90%
Disulfoton	<25%	60-140	90%
EPN	<25%	70-130	90%
Ethoprop	<25%	60-140	90%
Fensulfothion	<25%	70-130	90%
Fenthion	<25%	50-140	90%
Malathion	<25%	70-130	90%
Merphos	<25%	60-140	90%
Mevinphos	<25%	60-140	90%
Monocrotophos	<25%	50-140	90%
Naled	<25%	50-140	90%
Parathion-ethyl	<25%	60-140	90%
Parathion-methyl	<25%	60-140	90%
Phorate	<25%	60-140	90%
Ronnel	<25%	70-130	90%
Sulfotep	<25%	60-140	90%
TEPP	<25%	50-140	90%
Tetrachlorovinphos	<25%	60-140	90%
Tokuthion (Proctothiofos)	<25%	60-140	90%
Trichloronate	<25%	60-140	90%

TABLE 2-41
METHOD 8150B Aqueous Level III B Objectives

Compound	Precision (RPD) ^a	Accuracy (%Recovery) ^b	Completeness (%)
2,4-D	<20%	65-130	90%
Dalapon	<20%	60-130	90%
2,4-DB	<20%	80-120	90%
Dicamba	<20%	70-130	90%
Dichlorprop	<20%	70-130	90%
Dinoseb	<20%	80-120	90%
MCPA	<20%	70-130	90%
MCPP	<20%	80-120	90%
2,4,5-T	<20%	75-125	90%
2,4,5-TP	<20%	75-125	90%

TABLE 2-42
METHOD 8150B Solid Level III B Objectives

Compound	Precision (RPD) ^a	Accuracy (%Recovery) ^b	Completeness (%)
2,4-D	<25%	60-140	90%
Dalapon	<25%	60-140	90%
2,4-DB	<25%	60-140	90%
Dicamba	<25%	60-140	90%
Dichlorprop	<25%	60-140	90%
Dinoseb	<25%	60-140	90%
MCPA	<25%	60-140	90%
MCPP	<25%	60-140	90%
2,4,5-T	<25%	60-140	90%
2,4,5-TP	<25%	60-140	90%

^a Relative Percent Difference of Duplicate Sample analyses

^b Percent Recovery of Spike Sample analyses

TABLE 2-43
METHOD 8151 Aqueous Level III B Objectives

Compound	Precision (RPD) ^a	Accuracy (%Recovery) ^b	Completeness (%)
Acifluorfen	<20%	75-150	90%
Bentazon	<20%	70-150	90%
Chloramben	<20%	65-140	90%
2,4-D	<20%	60-140	90%
Dalapon	<20%	60-140	90%
2,4-DB	<20%	60-140	90%
DCPA diacid	<20%	60-130	90%
Dicamba	<20%	60-140	90%
3,5-Dichlorobenzoic acid	<20%	60-140	90%
Dichlorprop	<20%	60-140	90%
Dinoseb	<20%	60-140	90%
5-Hydroxydicamba	<20%	70-130	90%
MCPP	<20%	60-140	90%
MCPA	<20%	60-140	90%
4-Nitrophenol	<20%	60-140	90%
Pentachlorophenol	<20%	60-140	90%
Picloram	<20%	60-135	90%
2,4,5-T	<20%	65-135	90%
2,4,5-TP	<20%	60-140	90%

TABLE 2-44
METHOD 8151 Solid Level III B Objectives

Compound	Precision (RPD) ^a	Accuracy (%Recovery) ^b	Completeness (%)
Acifluorfen	<25%	75-150	90%
Bentazon	<25%	70-140	90%
Chloramben	<25%	65-140	90%
2,4-D	<25%	60-140	90%
Dalapon	<25%	60-140	90%
2,4-DB	<25%	60-140	90%
DCPA diacid	<25%	60-140	90%
Dicamba	<25%	60-140	90%
3,5-Dichlorobenzoic acid	<25%	60-140	90%
Dichlorprop	<25%	50-150	90%
Dinoseb	<25%	60-130	90%
5-Hydroxydicamba	<25%	60-130	90%
MCPP	<25%	60-140	90%
MCPA	<25%	60-140	90%
4-Nitrophenol	<25%	60-140	90%
Pentachlorophenol	<25%	60-140	90%
Picloram	<25%	60-135	90%
2,4,5-T	<25%	65-140	90%
2,4,5-TP	<25%	60-140	90%

- ^a Relative Percent Difference of Duplicate Sample analyses
^b Percent Recovery of Spike Sample analyses

3.3.3 Cleaning Procedure for Container Types: C, L

Sample Type: Metals, Cyanide, and Sulfide.


- a. Wash polyethylene bottles and caps in hot tap water using laboratory grade nonphosphate detergent.
- b. Rinse three times with tap water.
- c. Rinse with 1: 1 nitric acid (reagent grade HNO_3 , diluted with ASTM Type I deionized water).
- d. Rinse three times with ASTM Type I deionized water.
- e. Invert and air dry in contaminant-free environment.
- f. Cap bottles.
- g. Label each container with Lot number and pack in case.
- h. Label exterior of each case with Lot number.
- i. Store in contaminant-free area.

3.4 SAMPLE CONTAINER QUALITY ASSURANCE AND QUALITY CONTROL PROCEDURES

The two aspects of quality assurance (e.g., quality control and quality assessment) must be applied to sample containers as well as to the analytical measurements. Quality control includes the application of good laboratory practices and standard operating procedures especially designed for the cleaning of sample containers. The cleaning operation should be based on protocols especially designed for specific contaminant problems. Strict adherence to these cleaning protocols is imperative.

Quality assessment of the cleaning process depends largely on monitoring for adherence to the protocols. Because of their critical role in the quality assessment of the cleaning operation, protocols must be carefully designed and followed. Guidance is provided in this section on design and implementation of quality assurance and quality control protocols.

3.4.1 Quality Assurance

Major QA/QC activities should include the inspection of all incoming materials, QC analysis of cleaned lots of containers, and monitoring of the container storage area. Complete documentation of all QC inspection results (acknowledging acceptance or rejection) should be kept as part of the permanent bottle preparation files. QA/QC records (i. e., preparation/QC logs, analytical data, data tapes, storage ) should also be stored in a central location within the facility.

3.4.1.1 Incoming Materials Inspection

A representative item from each case of containers should be checked for conformance with specifications provided in Section Table 3-1. Any deviation should be considered unacceptable.

3.4.1.2 Quality Control Inspection of Cleaned Lots of Containers

Following container cleaning and labeling, two containers should be selected from each container lot to be used for QC purposes. The two categories of QC containers should be as follows:

A. Analysis QC Containers

One QC container per lot should be designated as the Analysis QC Container. The sample container preparer should analyze the Analysis QC Container(s) to check for contamination prior to releasing the associated container lot for use. The QC analyses procedures specified in the Quality Control Analysis part of this section for determining the presence of extractable and volatile organics, pesticides, metals, and cyanide should be utilized.

If the representative Analysis QC Container(s) passes QC inspection, the related lot of containers should be cleared for use and documentation of the QC inspection maintained.

If the representative Analysis QC Container(s) does not pass inspection per the specified QC Analysis procedures any container labels should be removed and the entire lot returned for reprocessing.

A laboratory standard and a blank should be run with each QC analysis. All QC analysis results should be kept in chronological order by QC report number in a central QC file. The QC numbers assigned should be documented in the preparation/QC log, indicating acceptance or rejection and date of analysis.

A container lot should not be released for shipment prior to QC analysis and clearance. Once the containers have passed QC inspection, the containers should be stored in a contaminant-free area until packaging and shipment.

B. Storage QC Containers:

One QC container per lot should be designated as the Storage QC Container. The Storage QC Container should be separated from the lot after cleaning and labeling and should be stored in a designated contaminant-free area. The date the container is placed in the storage area should be recorded in the storage QC container log.

The Storage QC Container should be removed periodically from the storage area and analyzed using the QC analysis procedures for that container type. Analysis of the Storage QC Container should be performed if contamination of the particular container lot comes into question at any time following shipment.

The designated storage area should be monitored continuously for volatile contaminants. A precleaned, 40 mL vial that has passed a QC inspection should be filled with ASTM Type I organic-free water and be placed in the storage area. This vial should be changed at one-week intervals. The removed vial should be subjected to analysis for volatile organics as described in the Quality Control Analysis part of this section. Any peaks indicate contamination. Identify contaminants, if present, and take appropriate corrective action.

3.4.2 Quality Control Analysis

The objectives of this section are to discuss techniques for the quality control (QC) analysis of sample containers to be used in conjunction with the cleaning procedures contained in Section 3.3

The types of QC analyses correlate with the types of containers being analyzed and their future use in sample collection. The QC analyses are intended for the determination of:

- Extractable organics and pesticides
- Volatile organics
- Metals
- Cyanide

QC analyses should be performed according to the container type and related sample type and utilize method(s) appropriate for the intended use of the sample containers and the quantitation limits contained in Table 3-2.

3.4.2.1 Determination of Extractable Organics:

Container Types: A, E, F, G, H, J, and K

A. Sample Preparation

1. Add 60 mL of pesticide-grade methylene chloride to the container and shake for two minutes.
2. Transfer the solvent to a Kuderna-Danish (KD) apparatus equipped with a three-ball Snyder column. Concentrate to less than 10 mL on a steam bath.
3. Add 50 mL of pesticide-grade hexane to the KD apparatus by slowly pouring down through the Snyder column. Concentrate to less than 10 mL to effect solvent replacement of hexane for methylene chloride.
4. Concentrate the solvent to 1 mL using a micro-Snyder column.
5. Prepare a solvent blank by adding 60 mL of the rinse solvent used in step F of the cleaning procedure for container types A, E, F, G, H, J, and K (Section II) directly to a KD apparatus and proceed as above.

B. Extractable Organics Sample Analysis

1. Instrument calibration should be performed as described in the appropriate method for the intended use of the sample containers and the quantitation limits contained in Table 3-2.
2. Any peaks found in the container solvent that are not found in the solvent blank or with peak heights or areas not within $\pm 50\%$ of the blank peak height or area should be cause for rejection.
3. Identify and quantitate any contaminant(s) that cause rejection of a container Lot.
4. A blank should be run with each analysis.

3.4.2.2 Determination of Volatile Organics:

Container Types: B and D

A. Sample Preparation and Analysis

1. Fill the container with ASTM Type I organic-free water.
2. Instrument calibration should be performed as described in the method as appropriate for the intended use of the sample containers and the quantitation limits contained in Table 3-2.
3. Any peaks not found in the blank or with peak heights or areas not within $\pm 50\%$ of the blank peak height or area should be cause for rejection.
4. Identify and quantitate any contaminant(s) that cause rejection of a container Lot.
5. A blank should be run with each analysis.

3.4.2.3 Determination of Metals:

Container Types: C, E, F, G, J, and L

A. Sample Preparation:

1. Add 50 mL of ASTM Type I deionized water to the container and acidity with 0.5 mL reagent-grade HNO_3 . Cap and shake well.
2. Treat the sample as a dissolved metals sample. Analyze the undigested water.

B. Sample Analysis:

1. Instrument calibration should be performed as described in the appropriate method for the intended use of the sample containers and the quantitation limits contained in Table 3-2.
2. The rinse solution should be analyzed before use on the bottles that are designated for analysis to ensure that a contaminated solution is not used for rinsing the bottles.

3.4.2.4 Determination of Cyanide:

Container Types: C and L

A. Sample Preparation and Analysis:

1. Instrument calibration and sample analysis should be performed as described in the appropriate method. Cyanide should be determined by placing 250 mL of ASTM Type I deionized water in the container. Add 1.25 mL of 6N NaOH. Cap the container and shake vigorously for two minutes. Analyze an aliquot by the EPA method selected. The detection limit should be 10 ppb or lower.
2. A blank should be run by analyzing an aliquot of the ASTM Type I water used above.
3. The detection of contaminants of 10 ppb cyanide should be cause for rejection of the lot of containers. (Note: Contamination could be due to the container, the cap or the NaOH).

TABLE 3-1

SAMPLE CONTAINER RECOMMENDATIONS

CONTAINER TYPE	SPECIFICATIONS
A <u>Container:</u> <u>Closure:</u>	80 oz. amber glass, ring handle bottle/jug. black phenolic, baked polyethylene cap, 0.015 mm teflon liner.
B <u>Container:</u> <u>Closure:</u> <u>Septum:</u>	40 mL glass vial black phenolic, open-top, screw cap. disc of .005 inch teflon bonded to .120 inch silicon for total thickness of 0.125 inch.
C <u>Container:</u> <u>Closure:</u>	1 liter high density polyethylene, cylinder-round bottle. white polyethylene, white ribbed, polyethylene liner.
D <u>Container:</u> <u>Closure:</u>	120 mL wide mouth, glass vial white polypropylene cap, 0.015 mm teflon liner.
E <u>Container:</u> <u>Closure:</u>	16 oz tall, wide mouth, straight sided, flint glass jar. black phenolic, baked polyethylene cap, 0.15 mm teflon liner.
F <u>Container:</u> <u>Closure:</u>	8 oz. short, wide mouth, straight sided, flint glass jar. black phenolic, baked polyethylene cap, 0.030 mm teflon liner.
G <u>Container:</u> <u>Closure:</u>	4 oz. tall, Wide mouth, straight-sided, flint glass jar. black phenolic, baked polyethylene cap, 0.015 mm teflon liner.
H <u>Container:</u> <u>Closure:</u>	1 liter amber, Boston round glass bottle, pour-out neck finish. black phenolic, baked polyethylene cap, 0.015 mm teflon liner.
J <u>Container:</u> <u>Closure:</u>	32 oz. tall, wide mouth, straight-sided, flint glass jar. black phenolic, baked polyethylene cap 0.015 mm teflon liner.
K <u>Container:</u> <u>Closure:</u>	4 liter amber glass, ring handle bottle/jug. black phenolic, baked polyethylene cap, 0.015 mm teflon liner.
L <u>Container:</u> <u>Closure:</u>	500 mL high-density polyethylene, cylinder-round bottle. white polyethylene cap, white ribbed, polyethylene liner.

Table 3-2
Organic Analyte Sample Container Specifications and
Required Quantitation Limits

<u>Volatile Compound</u>	<u>Water</u> <u>(ug/L)</u>
Chloromethane	1
Bromomethane	1
Vinyl Chloride	1
Chloroethane	1
Methylene Chloride	2
Acetone	5
Carbon Disulfide	1
1,1-Dichloroethene	1
1,1-Dichloroethane	1
1,2-Dichloroethene (total)	1
Chloroform	1
1,2-Dichloroethane	1
2-Butanone	5
1,1,1-Trichloroethane	1
Carbon Tetrachloride	1
Bromodichloromethane	1
1,2-Dichloropropane	1
cis-1,3-Dichloropropene	1
Trichloroethene	1
Dibromochloromethane	1
1,1,2-Trichloroethane	1
Benzene	1
Trans-1,3-Dichloropropene	1
Bromoform	1
4-Methyl-2-pentanone	5
2-Hexanone	5
Tetrachloroethene	1
Toluene	1
1,1,2,2-Tetrachloroethane	1
Chlorobenzene	1
Ethyle Benzene	1
Styrene	1
Xylenes (total)	1

Table 3-2
Organic Analyte Sample Container Specifications and
Required Quantitation Limits

<u>Compound</u>	<u>Water (ug/L)</u>
Phenol	5
bis(2-Chloroethyl) ether	10
2-Chlorophenol	5
1,2-Dichlorobenzene	5
1,3-Dichlorobenzene	5
1,4-Dichlorobenzene	5
2-Methylphenol	5
2,2'-oxybis (1-chloropropane)	5
4-Methylphenol	5
N-Nitroso-di-n-propylamine	5
Hexachloroethane	5
Nitrobenzene	5
Isophorone	5
2-Nitrophenol	5
2,4-Dimethylphenol	5
bis(2-Chloroethoxy) methane	5
2,4-Dichlorophenol	5
1,2,4-Trichlorobenzene	5
Naphthalene	5
4-Chloroaniline	5
Hexachlorobutadiene	5
4-Chloro-3-methylphenol	5
2-Methylnaphthalene	5
Hexachlorocyclopentadiene	5
2,4,6-Trichlorophenol	5
2,4,5-Trichlorophenol	20
2-Chloronaphthalene	5
2-Nitroaniline	20
Dimethylphthalate	5
Acenaphthalene	5
2,6-dinitrotoluene	5
3-Nitroaniline	20
Acenaphthene	5
2,4-Dinitrophenol	20
4-Nitrophenol	20

Table 3-2
Organic Analyte Sample Container Specifications
and Required Quantitation Limits

<u>Semi-Volatile Compound</u>	<u>Water</u> <u>(ug/L)</u>
Dibenzofuran	5
2,4-Dinitrotoluene	5
Diethylphthalate	5
4-Chlorophenyl-phenyl ether	5
Flourene	5
4-Nitroaniline	20
4,6-Dinitro-2-methylphenol	20
N-nitrosodiphenylamine	5
4-Bromophenyl-phenyl ether	5
Hexachlorobenzene	5
pentachlorophenol	20
Phenanthrene	5
Anthracene	5
Carbazole	5
Di-n-butylphthalate	5
Fluoranthene	5
Pyrene	5
Butylbenzylphthalate	5
3,3'-Dichlorobenzidine	5
Benzo(a)anthracene	5
Chrysene	5
bis(2-Ethylhexyl)phthalate	5
Di-n-octylphthalate	5
Benzo(b)fluoranthene	5
Benzo(k)fluoranthene	5
Benzo(a)pyrene	5
Indeno(1,2,3-cd)pyrene	5
Dibenz(a,h)anthracene	5
Benzo(g,h,i)perylene	5

Table 3-2
Organic Analyte Sample Container Specifications
and Required Quantitation Limits

<u>Pesticide/PCBs</u>	<u>Water</u> <u>(ug/L)</u>
alpha-BHC	0.025
beta-BHC	0.025
delta-BHC	0.025
gamma-BHC	0.025
Heptachlor	0.025
Aldrin	0.025
Heptachlor epoxide	0.025
Endosulfan I	0.025
Dieldrin	0.05
4,4'-DDE	0.05
Endrin	0.05
Endosulfan II	0.05
4,4'-DDD	0.05
Endosulfan sulfate	0.05
4,4'-DDT	0.05
Methoxychlor	0.25
Endrin ketone	0.05
endrin aldehyde	0.05
alpha-Chlordane	0.025
gamma-Chlordane	0.025
Toxaphene	0.50
Aroclor - 1016	0.25
Aroclor - 1221	0.50
Aroclor - 1232	0.25
Aroclor - 1242	0.25
Aroclor - 1248	0.25
Aroclor - 1254	0.50
Aroclor - 1260	0.50

Table 3-2
Inorganic Analyte Sample Container Specifications and
Required Quantitation Limits

Analyte	Water($\mu\text{g/L}$)
Aluminum	100
Antimony	10
Arsenic	1
Barium	20
Beryllium	1
Cadmium	2
Calcium	100
Chromium	10
Cobalt	10
Copper	10
Iron	100
Lead	2
Magnesium	100
Manganese	10
Mercury	0.2
Nickel	20
Potassium	100
Selenium	2
Silver	10
Sodium	100
Thallium	10
Vanadium	20
Zinc	20
Cyanide	10

4.0 SAMPLE CUSTODY, PRESERVATION, AND HOLDING TIMES

4.1 SAMPLE CUSTODY

It is IEPA Pre-Notice Program recommendation to follow the sample custody protocols as described in "NEIC Policies and Procedures", EPA-330/9-78 DDI-R, Revised June 1985. For the laboratory this custody is in two parts: laboratory analysis, and documentation files. Files, including all originals of laboratory reports and purge files, should be maintained under document control in a secure area.

A sample, sample data, or documentation files is under your custody if they

1. are in your possession;
2. are in your view, after being in your possession;
3. are in your possession and you place them in a secured location; or
4. are in a designated secure area.

The laboratory should have custody procedures for sample receiving and log-in; sample storage; tracking during sample preparation and analysis; and storage of data which would allow the laboratory to demonstrate, if necessary, that sample and data custody as defined above was maintained.

4.2 PRESERVATION AND HOLDING TIMES

The laboratory must assure that the Preservation and Holding Time Criteria contained in the following table are met. Any deviations from the criteria by either the laboratory or the Program participant submitting samples to the laboratory must be noted in the laboratory's data reports. See Table 3-1 of this Analytical Quality Assurance Plan for detailed descriptions of the appropriate container types.

Table 4-1 Sample Containers, Preservatives, and Holding Times			
Analysis	Container Type	Preservatives	Holding Times
Volatile Organics	Glass	Cool to 4°C w/HCL to a pH<2	14 Days
Extractable Organics	Glass	Cool to 4°C	7 Days until extraction, 40 Days after extraction
Metals (except Hg)	Polyethylene or glass	HNO ₃ to a pH<2	6 Months
Mercury	Polyethylene or glass	HNO ₃ to a pH<2	28 Days
Cyanide	Polyethylene or glass	NaOH to a pH>12	14 Days

5.0 ANALYTICAL PROCEDURES AND CALIBRATIONS

This section of the Analytical Quality Assurance Plan covers the laboratory analytical procedures and calibration procedures to be used to obtain data for the Pre-Notice Site Cleanup Program (Program). All analytical procedures and calibrations are contained in the "USEPA Test Methods for Evaluating Solid Waste, Physical/Chemical Methods, SW-846, 3rd Edition" with updates. The analytical and calibration procedures have been selected based upon the Program's two categories (A and B) of decisions and determinations and upon the Program's need to obtain data that meets or exceeds the objectives as previously described as data quality levels IIIA and IIIB. (See Section 2.0 of this document for a description of the categories and levels).

5.1 SAMPLE PREPARATION PROCEDURES

Prior to analysis samples must undergo an appropriate preparation procedure. This section lists the acceptable U.S.EPA sample digestion, extraction, and introduction procedures.

5.1.1 Metallic Analytes

Prior to analysis, samples must be solubilized or digested using the appropriate method. When analyzing for dissolved constituents, acid digestion is not necessary if the samples are filtered at the time of collection followed by acid preservation. The USEPA SW-846 methods are, 1311, 3005A, 3010A, 3015, 3020A, 3040, 3050A, and 3051. When analyzing samples by Toxicity Characteristic Leaching Procedure (TCLP Method 1311) the TCLP extracts must also be prepared by the appropriate 3000 series method.

5.1.2 Organic Analytes

5.1.2.1 Extraction Procedures

Water and soil samples for base/neutral and acid extractables and organochlorine pesticides/PCBs must undergo solvent extraction prior to analysis. The method that should be used on a particular sample is highly dependent upon the physical characteristics of that sample. The USEPA SW-846 methods are 1311, 3510B, 3520B, 3540B, 3550B, and 3580B. When analyzing samples by Toxicity Characteristic Leaching Procedure (TCLP Method 1311) the TCLP extracts must also be prepared by the appropriate 3000 series method. Each category in Table 5-1, PREPARATION METHODS FOR ORGANIC ANALYTES, corresponds to the preparative methods available.

5.1.2.2 Direct Introduction Procedure

Water and soil samples for purgeable organics must undergo the technique of purge and trap for the introduction of purgeable organics into a gas chromatograph. The USEPA SW-846 method is 5030A.

5.1.2.3 Cleanup Procedures

Cleanup procedures employed are determined by the analytes of interest within the extract. Cleanup of a sample may be done exactly as instructed in the cleanup method for some of the analytes. However, there may be some instances where, in order to meet the Program data quality objectives, cleanup is performed using a modification of one of the procedures to optimize recovery and separation. In the event of cleanup modification the laboratory must retain sufficient documentation to demonstrate the necessity of and efficacy of the modifications. Extracts with components which interfere with spectral or chromatographic determinations are expected to be subjected to cleanup procedures. The USEPA SW-846 Cleanup Procedures are 3610, 3611, 3620, 3630, 3640, 3650, and 3660. Each category in Table 5-2, RECOMMENDED CLEANUP TECHNIQUES FOR INDICATED GROUPS OF COMPOUNDS, corresponds to the determinative methods available.

5.2 ANALYTICAL METHODS

Tables 1-1 through 1-4 list the analytical procedures to be used for the generation of data for Category A decisions and determinations. Table 1-5 lists the analytical procedures to be used for generation of data for Category B decisions and determinations. For all series 7000 methods the instructions on analysis contain in method 7000 must be followed in addition to those instructions contained in the individual methods. For all series 8000 methods the instructions on analysis contain in method 8000A must be followed in addition to those instructions contained in the individual methods.

5.3 CALIBRATION PROCEDURES AND FREQUENCIES

Calibration of laboratory equipment will be based on USEPA SW-846 procedures. Records of calibrations ~~will be~~ filed and maintained by the laboratory. These records will be filed at the location where the work is performed and will be subject to Agency audit.

5.3.1 Calibration for Organic Analyses by Gas Chromatograph

The recommended gas chromatographic columns and operating conditions for the instrument are specified in the USEPA SW-846 determinative method.

Establish gas chromatographic operating parameters equivalent to those indicated in Section 7.0 of the USEPA SW-846 determinative method of interest. Prepare calibration standards using the procedures indicated in Section 5.0 of the determinative method of interest. Calibrate the chromatographic system using either the external standard technique or the internal standard technique as contained in Section 7.0 of USEPA method 8000A.

Prior to calibration, the instrument(s) used for Gas Chromatograph/Mass Spectrometer (GC/MS) analyses are tuned by analysis of p-bromofluorobenzene (BFB) for volatile analyses and decafluorotriphenyl phosphine (DFTPP) for semi-volatile analyses. Once the tuning criteria specified in the method for these reference compounds are met, the instrument should be initially calibrated by using a five point calibration curve. The instrument tune will be verified each 12 hours of operation.

5.3.2 Continuing Calibration for Organic Analyses

5.3.2.1 Gas Chromatography

The working calibration curve or calibration factor must be initially verified at the beginning of each working day by the injection of one or more calibration standards. The acceptable response criteria for any analyte of interest is $\pm 15\%$ of the response from the original calibration. If the response for any analyte of interest does not meet the acceptable response criteria no analyses for that analyte can occur until corrective action is taken and a new calibration curve prepared for that analyte.

For each analytical run, after the initial verification, continuing calibration verification of the working calibration curve or calibration factor must be performed every 12 hours and at the end of the run. The acceptable response criteria for any analyte of interest varies is $\pm 15\%$ of the original response. If the response for any analyte of interest does not meet the acceptable response criteria, the run is terminated, corrective action taken, a new calibration curve be prepared for that analyte and any samples analyzed since the last acceptable calibration verification must be reanalyzed.

5.3.2.2 Gas Chromatograph / Mass Spectrometry

The working calibration curve, calibration factor or response factor must be initially verified at the beginning of each analytical run day and every 12 hours during analysis by the techniques specified in section 7.4 of SW-846 methods 8240, 8250, 8260, and 8270. The acceptable response criteria for any analyte of interest are provided in section 7.4 of SW-846 methods 8240, 8250, 8260, and 8270.

5.3.3 Calibration for Metallic Analytes by Spectrometer

Establish spectrometer operating parameters equivalent to those indicated in Section 7.0 of the USEPA SW-846 determinative method of interest. Prepare calibration standards using the procedures indicated in Section 5.0 of the determinative method of interest. Calibrate the spectrometer system using the standard technique as contained in Section 7.0 of USEPA method 7000A.

TABLE 2-45
METHOD 8240B/8260A Aqueous Level III B Objectives

Compound	Precision (RPD) ^a	Accuracy (%Recovery) ^b	Completeness (%)
Benzene	<20%	74-120	90%
Bromobenzene	<20%	78-122	90%
Bromochloromethane	<20%	64-121	90%
Bromodichloromethane	<20%	70-120	90%
Bromoform	<20%	75-126	90%
Bromomethane	<20%	62-128	90%
n-Butylbenzene	<20%	70-130	90%
sec-Butylbenzene	<20%	70-130	90%
tert-Butylbenzene	<20%	73-131	90%
Carbon tetrachloride	<20%	50-120	90%
Chlorobenzene	<20%	74-122	90%
Chloroethane	<20%	53-125	90%
Chloroform	<20%	65-115	90%
Chloromethane	<20%	57-129	90%
2-Chlorotoluene	<20%	65-115	90%
4-Chlorotoluene	<20%	66-132	90%
1,2-Dibromo-3-chloropropane	<20%	40-140	90%
Dibromochloromethane	<20%	64-120	90%
1,2-Dibromoethane	<20%	86-118	90%
Dibromomethane	<20%	77-122	90%
1,2-Dichlorobenzene	<20%	68-118	90%
1,3-Dichlorobenzene	<20%	71-127	90%
1,4-Dichlorobenzene	<20%	77-129	90%
Dichlorodifluoromethane	<20%	60-121	90%
1,1-Dichloroethane	<20%	75-117	90%
1,2-Dichloroethane	<20%	73-117	90%
1,1-Dichloroethene	<20%	67-121	90%
cis-1,2-Dichloroethene	<20%	74-128	90%
trans-1,2-Dichloroethene	<20%	71-116	90%
1,2-Dichloropropane	<20%	73-121	90%
1,3-Dichloropropane	<20%	72-120	90%
2,2-Dichloropropane	<20%	40-140	90%
1,1-Dichloropropene	<20%	62-134	90%
Ethylbenzene	<20%	65-133	90%
Hexachlorobutadiene	<20%	73-127	90%
Isopropylbenzene	<20%	70-130	90%
p-Isopropyltoluene	<20%	72-128	90%
Methylene chloride	<20%	73-117	90%
Naphthalene	<20%	71-137	90%
n-Propylbenzene	<20%	77-123	90%
Styrene	<20%	73-131	90%
1,1,1,2-Tetrachloroethane	<20%	63-120	90%
1,1,1,2,2-Tetrachloroethane	<20%	66-120	90%
1,1,2,2-Tetrachloroethane	<20%	62-120	90%
Toluene	<20%	70-134	90%
1,2,3-Trichlorobenzene	<20%	75-143	90%
1,2,4-Trichlorobenzene	<20%	75-141	90%
1,1,1-Trichloroethane	<20%	66-130	90%
1,1,2-Trichloroethane	<20%	74-133	90%
Trichloroethene	<20%	61-119	90%
Trichlorofluoromethane	<20%	57-122	90%
1,2,3-Trichloropropane	<20%	50-160	90%
1,2,4-Trimethylbenzene	<20%	67-131	90%
1,3,5-Trimethylbenzene	<20%	62-122	90%
Vinyl chloride	<20%	71-127	90%
o-Xylene	<20%	74-132	90%
m-Xylene	<20%	71-123	90%
p-Xylene	<20%	73-135	90%

^a Relative Percent Difference of Duplicate Sample analyses

^b Percent Recovery of Spike Sample analyses

TABLE 2-46
METHOD 8240B/8260A Solids Level III B Objectives

Compound	Precision (RPD) ^a	Accuracy (%Recovery) ^b	Completeness (%)
Benzene	<30%	60-140	90%
Bromobenzene	<30%	60-140	90%
Bromochloromethane	<30%	60-140	90%
Bromodichloromethane	<30%	60-140	90%
Bromoform	<30%	60-140	90%
Bromomethane	<30%	60-140	90%
n-Butylbenzene	<30%	60-140	90%
sec-Butylbenzene	<30%	60-140	90%
tert-Butylbenzene	<30%	60-140	90%
Carbon tetrachloride	<30%	40-140	90%
Chlorobenzene	<30%	60-140	90%
Chloroethane	<30%	40-140	90%
Chloroform	<30%	50-140	90%
Chloromethane	<30%	50-140	90%
2-Chlorotoluene	<30%	50-140	90%
4-Chlorotoluene	<30%	50-140	90%
1,2-Dibromo-3-chloropropane	<30%	40-140	90%
Dibromochloromethane	<30%	50-140	90%
1,2-Dibromoethane	<30%	60-140	90%
Dibromomethane	<30%	60-140	90%
1,2-Dichlorobenzene	<30%	50-140	90%
1,3-Dichlorobenzene	<30%	50-140	90%
1,4-Dichlorobenzene	<30%	60-140	90%
Dichlorodifluoromethane	<30%	50-140	90%
1,1-Dichloroethane	<30%	60-140	90%
1,2-Dichloroethane	<30%	60-140	90%
1,1 Dichloroethene	<30%	50-140	90%
cis-1,2-Dichloroethene	<30%	60-140	90%
trans-1,2-Dichloroethene	<30%	60-140	90%
1,2-Dichloropropane	<30%	60-140	90%
1,3-Dichloropropane	<30%	60-140	90%
2,2-Dichloropropane	<30%	40-140	90%
1,1-Dichloropropene	<30%	50-140	90%
Ethylbenzene	<30%	50-140	90%
Hexachlorobutadiene	<30%	60-140	90%
Isopropylbenzene	<30%	60-140	90%
p-Isopropyltoluene	<30%	60-140	90%
Methylene chloride	<30%	60-140	90%
Naphthalene	<30%	60-140	90%
n-Propylbenzene	<30%	60-140	90%
Styrene	<30%	60-140	90%
1,1,1,2-Tetrachloroethane	<30%	50-140	90%
1,1,2,2-Tetrachloroethane	<30%	50-140	90%
Tetrachloroethane	<30%	50-140	90%
Toluene	<30%	60-140	90%
1,2,3-Trichlorobenzene	<30%	60-140	90%
1,2,4-Trichlorobenzene	<30%	60-140	90%
1,1,1-Trichloroethane	<30%	50-140	90%
1,1,2-Trichloroethane	<30%	60-140	90%
Trichloroethene	<30%	50-140	90%
Trichlorofluoromethane	<30%	40-140	90%
1,2,3-Trichloropropane	<30%	40-140	90%
1,2,4-Trimethylbenzene	<30%	50-140	90%
1,3,5-Trimethylbenzene	<30%	50-140	90%
Vinyl chloride	<30%	60-140	90%
o-Xylene	<30%	60-140	90%
m-Xylene	<30%	60-140	90%
p-Xylene	<30%	60-140	90%

^a Relative Percent Difference of Duplicate Sample analyses

^b Percent Recovery of Spike Sample analyses

TABLE 2-47 (Page 1 of 2)
METHOD 8250A/8270B Aqueous Level III B Objectives

Compound	Precision (RPD) ^a	Accuracy (%Recovery) ^b	Completeness (%)
Acenaphthene	<25%	76-116	90%
Acenaphthylene	<25%	66-112	90%
Aldrin	<25%	60-115	90%
Anthracene	<25%	60-115	90%
Benzo(a)anthracene	<25%	65-115	90%
Chloroethane	<25%	83-115	90%
Benzo(b)fluoranthene	<25%	64-119	90%
Benzo(k)fluoranthene	<25%	60-120	90%
Benzo(a)pyrene	<25%	60-120	90%
Benzo(g,h,i)perylene	<25%	60-148	90%
Butyl benzyl phthalate	<25%	60-140	90%
beta-BHC	<25%	60-115	90%
gamma-BHC	<25%	50-150	90%
Bis(2-chloroethyl)ether	<25%	60-125	90%
Bis(2-chloroethoxy)methane	<25%	75-140	90%
Bis(2-chloroisopropyl)ether	<25%	75-125	90%
Bis(2-ethylhexyl)phthalate	<25%	60-130	90%
4-Bromophenyl phenyl ether	<25%	75-120	90%
2-Chloronaphthalene	<25%	77-120	90%
4-Chlorophenyl phenyl ether	<25%	70-120	90%
Chrysene	<25%	62-125	90%
4,4'-DDD	<25%	60-140	90%
4,4'-DDE	<25%	60-140	90%
4,4'-DDT	<25%	60-140	90%
Dibenz(a,h)anthracene	<25%	60-140	90%
Di-n-butylphthalate	<25%	60-140	90%
1,2-Dichlorobenzene	<25%	60-140	90%
1,3-Dichlorobenzene	<25%	60-140	90%
1,4-Dichlorobenzene	<25%	60-140	90%
3,3'-Dichlorobenzidine	<25%	60-165	90%

- a Relative Percent Difference of Duplicate Sample analyses
b Percent Recovery of Spike Sample analyses

TABLE 2-47 (Page 2 of 2) METHOD 8250A/8270B Aqueous Level III B Objectives			
Compound	Precision (RPD) ^a	Accuracy (%Recovery) ^b	Completeness (%)
Dieldrin	<25%	60-140	90%
Diethylphthalate	<25%	60-140	90%
Dimethylphthalate	<25%	60-150	90%
2,4-Dinitrotoluene	<25%	68-120	90%
2,6-Dinitrotoluene	<25%	75-125	90%
Di-n-octylphthalate	<25%	60-135	90%
Endosulfan sulfate	<25%	50-150	90%
Endrin aldehyde	<25%	60-140	90%
Fluoranthene	<25%	60-140	90%
Fluorene	<25%	75-125	90%
Heptachlor	<25%	50-130	90%
Heptachlor epoxide	<25%	65-125	90%
Hexachlorobenzene	<25%	60-140	90%
Hexachlorobutadiene	<25%	60-130	90%
Hexachloroethane	<25%	60-130	90%
Indeno(1,2,3-cd)pyrene	<25%	60-140	90%
Isophorone	<25%	75-150	90%
Naphthalene	<25%	60-130	90%
Nitrobenzene	<25%	75-135	90%
N-Nitrosodi-n-propylamine	<25%	60-150	90%
PCB-1260	<25%	60-140	90%
Phenanthrene	<25%	70-120	90%
Pyrene	<25%	70-125	90%
1,2,4-Trichlorobenzene	<25%	74-120	90%
4-Chloro-3-methylphenol	<25%	60-130	90%
2-Chlorophenol	<25%	75-120	90%
2,4-Dichlorophenol	<25%	75-120	90%
2,4-Dimethylphenol	<25%	65-140	90%
2,4-Dinitrophenol	<25%	65-140	90%
2-Methyl-4,6-dinitrophenol	<25%	65-140	90%
2-Nitrophenol	<25%	60-160	90%
4-Nitrophenol	<25%	50-140	90%
Pentachlorophenol	<25%	67-125	90%
Phenol	<25%	60-140	90%
2,4,6-Trichlorophenol	<25%	65-135	90%

- ^a Relative Percent Difference of Duplicate Sample analyses
^b Percent Recovery of Spike Sample analyses

TABLE 2-48 (Page 1 of 2)
METHOD 8250A/8270B Solids Level III B Objectives

Compound	Precision (RPD) ^a	Accuracy (%Recovery) ^b	Completeness (%)
Acenaphthene	<30%	60-140	90%
Acenaphthylene	<30%	60-140	90%
Aldrin	<30%	60-140	90%
Anthracene	<30%	60-140	90%
Benzo(a)anthracene	<30%	60-140	90%
Chloroethane	<30%	60-140	90%
Benzo(b)fluoranthene	<30%	60-140	90%
Benzo(k)fluoranthene	<30%	60-140	90%
Benzo(a)pyrene	<30%	60-140	90%
Benzo(g,h,i)perylene	<30%	60-140	90%
Butyl benzyl phthalate	<30%	60-140	90%
beta-BHC	<30%	50-140	90%
gamma-BHC	<30%	60-140	90%
Bis(2-chloroethyl)ether	<30%	60-140	90%
Bis(2-chloroethoxy)methane	<30%	60-140	90%
Bis(2-chloroisopropyl)ether	<30%	60-140	90%
Bis(2-ethylhexyl)phthalate	<30%	60-140	90%
4-Bromophenyl phenyl ether	<30%	60-140	90%
2-Chloronaphthalene	<30%	60-140	90%
4-Chlorophenyl phenyl ether	<30%	60-140	90%
Chrysene	<30%	60-140	90%
4,4'-DDD	<30%	50-140	90%
4,4'-DDE	<30%	50-140	90%
4,4'-DDT	<30%	50-140	90%
Dibenz(a,h)anthracene	<30%	50-140	90%
Di-n-butylphthalate	<30%	50-140	90%
1,2-Dichlorobenzene	<30%	60-140	90%
1,3-Dichlorobenzene	<30%	60-140	90%
1,4-Dichlorobenzene	<30%	60-140	90%
3,3'-Dichlorobenzidine	<30%	60-140	90%

- ^a Relative Difference of Duplicate Sample analyses
^b Percent Recovery of Spike Sample analyses

TABLE 2-48 (Page 2 of 2)
METHOD 8250A/8270B Solids Level III B Objectives

Compound	Precision (RPD) ^a	Accuracy (%Recovery) ^b	Completeness (%)
Dieldrin	<30%	60-140	90%
Diethylphthalate	<30%	60-140	90%
Dimethylphthalate	<30%	60-140	90%
2,4-Dinitrotoluene	<30%	60-140	90%
2,6-Dinitrotoluene	<30%	60-140	90%
Di-n-octylphthalate	<30%	60-140	90%
Endosulfan sulfate	<30%	60-140	90%
Endrin aldehyde	<30%	60-140	90%
Fluoranthene	<30%	50-140	90%
Fluorene	<30%	60-140	90%
Heptachlor	<30%	60-140	90%
Heptachlor epoxide	<30%	60-140	90%
Hexachlorobenzene	<30%	50-140	90%
Hexachlorobutadiene	<30%	50-140	90%
Hexachloroethane	<30%	50-140	90%
Indeno(1,2,3-cd)pyrene	<30%	50-140	90%
Isophorone	<30%	60-140	90%
Naphthalene	<30%	50-140	90%
Nitrobenzene	<30%	60-140	90%
N-Nitrosodi-n-propylamine	<30%	50-140	90%
PCB-1260	<30%	50-140	90%
Phenanthrene	<30%	60-140	90%
Pyrene	<30%	60-140	90%
1,2,4-Trichlorobenzene	<30%	60-140	90%
4-Chloro-3-methylphenol	<30%	60-140	90%
2-Chlorophenol	<30%	60-140	90%
2,4-Dichlorophenol	<30%	60-140	90%
2,4-Dimethylphenol	<30%	60-140	90%
2,4-Dinitrophenol	<30%	60-140	90%
2-Methyl-4,6-dinitrophenol	<30%	50-140	90%
2-Nitrophenol	<30%	60-140	90%
4-Nitrophenol	<30%	60-140	90%
Pentachlorobenzene	<30%	60-140	90%
Phenol	<30%	50-140	90%
2,4,6-Trichlorophenol	<30%	60-140	90%

^a Relative Percent Difference of Duplicate Sample analyses

^b Percent Recovery of Spike Sample analyses

TABLE 2-49 METHOD 8310 Aqueous Level III B Objectives			
Compound	Precision (RPD) ^a	Accuracy (%Recovery) ^b	Completeness (%)
Acenaphthene	<25%	55-140	90%
Acenaphthylene	<25%	60-140	90%
Anthracene	<25%	60-140	90%
Benzo(a)anthracene	<25%	65-140	90%
Benzo(a)pyrene	<25%	55-140	90%
Benzo(b)fluoranthene	<25%	65-140	90%
Benzo(ghi)perylene	<25%	55-140	90%
Benzo(k)fluoranthene	<25%	55-140	90%
Chrysene	<25%	55-140	90%
Dibenzo(a,h)anthracene	<25%	55-140	90%
Fluoranthrene	<25%	65-140	90%
Fluorene	<25%	60-140	90%
Indeno(1,2,3-cd)pyrene	<25%	60-140	90%
Naphthalene	<25%	60-140	90%
Phenanthrene	<25%	55-140	90%
Pyrene	<25%	65-140	90%

TABLE 2-50 METHOD 8310 Solids Level III B Objectives			
Compound	Precision (RPD) ^a	Accuracy (%Recovery) ^b	Completeness (%)
Acenaphthene	<30%	50-150	90%
Acenaphthylene	<30%	55-150	90%
Anthracene	<30%	55-150	90%
Benzo(a)anthracene	<30%	60-140	90%
Benzo(a)pyrene	<30%	50-150	90%
Benzo(b)fluoranthene	<30%	60-140	90%
Benzo(ghi)perylene	<30%	50-140	90%
Benzo(k)fluoranthene	<30%	50-150	90%
Chrysene	<30%	50-150	90%
Dibenzo(a,h)anthracene	<30%	50-150	90%
Fluoranthrene	<30%	60-140	90%
Fluorene	<30%	60-150	90%
Indeno(1,2,3-cd)pyrene	<30%	60-150	90%
Naphthalene	<30%	60-150	90%
Phenanthrene	<30%	50-150	90%
Pyrene	<30%	60-140	90%

TABLE 2-51 METHOD 8315 Aqueous Level III B Objectives			
Compound	Precision (RPD) ^a	Accuracy (%Recovery) ^b	Completeness (%)
Formaldehyde	<30%	70 - 125	90
Acetaldehyde	<30%	60 - 120	90

TABLE 2-52 METHOD 8315 Solids Level III B Objectives			
Compound	Precision (RPD) ^a	Accuracy (%Recovery) ^b	Completeness (%)
Formaldehyde	<30%	60 - 125	90
Acetaldehyde	<30%	60 - 125	90

- a Relative Percent Difference of Duplicate Sample analyses
b Percent Recovery of Spike Sample analyses

TABLE 2-53 METHOD 8316 Aqueous Level III B Objectives			
Compound	Precision (RPD) ^a	Accuracy (%Recovery) ^b	Completeness (%)
Acrylamide	<20%	65-135	90%
Acrylonitrile	<20%	65-135	90%
Acrolein (Propenal)	<20%	65-135	90%

TABLE 2-54 METHOD 8316 Solids Level III B Objectives			
Compound	Precision (RPD) ^a	Accuracy (%Recovery) ^b	Completeness (%)
Acrylamide	<25%	60-140	90%
Acrylonitrile	<25%	60-140	90%
Acrolein (Propenal)	<25%	60-140	90%

TABLE 2-55 METHOD 8318 Aqueous Level III B Objectives			
Compound	Precision (RPD) ^a	Accuracy (%Recovery) ^b	Completeness (%)
Aldicarb Sulfone	<20%	65-140	90%
Methomyl (Lannate)	<20%	70-135	90%
3-Hydroxycarbofuran	<20%	60-140	90%
Dioxacarb	<20%	70-135	90%
Aldicarb (Temik)	<20%	65-140	90%
Propoxur (Baygon)	<20%	65-140	90%
Carbofuran (Furadan)	<20%	70-135	90%
Carbaryl (Sevin)	<20%	70-135	90%
Methiocarb (Mesurol)	<20%	65-140	90%
Promecarb	<20%	65-140	90%

TABLE 2-56 METHOD 8318 Solids Level III B Objectives			
Compound	Precision (RPD) ^a	Accuracy (%Recovery) ^b	Completeness (%)
Aldicarb Sulfone	<25%	65-140	90%
Methomyl (Lannate)	<25%	60-140	90%
3-Hydroxycarbofuran	<25%	65-145	90%
Dioxacarb	<25%	60-140	90%
Aldicarb (Temik)	<25%	60-140	90%
Propoxur (Baygon)	<25%	60-140	90%
Carbofuran (Furadan)	<25%	65-145	90%
Carbaryl (Sevin)	<25%	65-145	90%
Methiocarb (Mesurol)	<25%	60-140	90%
Promecarb	<25%	60-145	90%

a Relative Percent Difference of Duplicate Sample analyses
b Percent Recovery of Spike Sample analyses

TABLE 2 - 57
INORGANIC Aqueous Level III B Objectives

Analyte	Precision (RPD) ^a	Accuracy (%Recovery) ^b	Completeness (%)
Aluminum	<20%	80-120	90%
Antimony	<20%	80-120	90%
Arsenic	<20%	80-120	90%
Barium	<20%	80-120	90%
Beryllium	<20%	80-120	90%
Cadmium	<20%	80-120	90%
Calcium	<20%	80-120	90%
Chromium	<20%	80-120	90%
Cobalt	<20%	80-120	90%
Copper	<20%	80-120	90%
Iron	<20%	80-120	90%
Lead	<20%	80-120	90%
Magnesium	<20%	80-120	90%
Manganese	<20%	80-120	90%
Mercury	<20%	80-120	90%
Nickel	<20%	80-120	90%
Potassium	<20%	80-120	90%
Selenium	<20%	80-120	90%
Silver	<20%	80-120	90%
Sodium	<20%	80-120	90%
Thallium	<20%	80-120	90%
Vanadium	<20%	80-120	90%
Zinc	<20%	80-120	90%
Cyanide	<20%	80-120	90%

TABLE 2 - 58
INORGANIC Solids Level III B Objectives

Analyte	Precision (RPD) ^a	Accuracy (% Recovery) ^b	Completeness (%)
Aluminum	<30%	70-130	90%
Antimony	<30%	70-130	90%
Arsenic	<30%	70-130	90%
Barium	<30%	70-130	90%
Beryllium	<30%	70-130	90%
Cadmium	<30%	70-130	90%
Calcium	<30%	70-130	90%
Chromium	<30%	70-130	90%
Cobalt	<30%	70-130	90%
Copper	<30%	70-130	90%
Iron	<30%	70-130	90%
Lead	<30%	70-130	90%
Magnesium	<30%	70-130	90%
Manganese	<30%	70-130	90%
Mercury	<30%	70-130	90%
Nickel	<30%	70-130	90%
Potassium	<30%	70-130	90%
Selenium	<30%	70-130	90%
Silver	<30%	70-130	90%
Sodium	<30%	70-130	90%
Thallium	<30%	70-130	90%
Vanadium	<30%	70-130	90%
Zinc	<30%	70-130	90%
Cyanide	<30%	70-130	90%

- ^a Relative Percent Difference of Duplicate Sample analyses
^b Percent Recovery of Spike Sample analyses



3.0 SAMPLE CONTAINERS

Most environmental sampling and analytical applications offer numerous opportunities for sample contamination. For this reason, contamination is a common source of error in environmental measurements. The sample container itself represents one such source of sample contamination. Therefore, the specifications and guidance for the preparation of contaminant-free sample containers has been prepared to assist the Program participants in obtaining sample containers from vendors or to assist the laboratories providing the sample containers to prepare contaminant free sample containers. The specifications and guidance are designed to minimize contamination which could affect subsequent analytical determinations. Most analysis activities require all component materials (caps, liners, septa, packaging materials, etc) provided by the bottle preparer to meet or exceed the criteria limits of bottle specifications listed within this section.

3.1 SAMPLE CONTAINER AND COMPONENT MATERIAL GUIDLINES

A variety of factors affect the choice of containers and cap material for each bottle type. These include resistance to breakage, size, weight, interferences with target analytes, cost, and availability.

Container types A through L in Table 3-1 are the type of sample containers that have been successfully used in the past. Kimax or Pyrex brand borosilicate glass is inert to most materials and is recommended where glass containers are used (i.e., pesticides and other organics). Conventional polyethylene is recommended when plastic is acceptable because of reasonable cost and less absorption of metal ions. The specific sampling situation will determine the use of plastic or glass.

3.2 MAXIMUM CONTAMINANT LEVEL SPECIFICATIONS FOR SAMPLE CONTAINERS

For inorganic sample containers, the Required Quantitation Limits (RQLs) listed in Table 3-2 are the guidelines for maximum trace metal contamination. Concentration at or above these limits on any parameter should preclude these containers from use in collecting inorganic samples. Table 3-2 applies only to the preparation of sample containers, it does not apply to the analysis of samples for any Pre-Notice Program site investigation.

The RQL guidelines for organic sample containers are listed in Table 3-2. When the RQL in Table 3-2 is multiplied by the appropriate factor listed below, the resulting value then represents the maximum concentration guidelines for particular sample containers based on organic sample sizes for routine analyses. Table 3-2 applies only to the preparation of sample containers, it does not apply to the analysis of samples for any Pre-Notice Program site investigation.

<u>Container type</u>	<u>Multiple of RQL</u>
A	1.0
B	0.5
D	10.0
E	8.0
F	4.0
G	2.0
H	0.5
J	0.5
K	2.0

3.3 SAMPLE CONTAINER PREPARATION CLEANING PROCEDURES

The purpose of this Section is to provide guidance on cleaning procedures for preparing contaminant-free sample containers. In selecting cleaning procedures for sample containers, it is important to consider all of the parameters of interest. Although a given cleaning procedure may be effective for one parameter or type of analysis it may be ineffective for another. When multiple determinations are performed on a single sample or on a subsample from a single container, a cleaning procedure may actually be a source of contamination for some analytes while minimizing contamination in others. It should be the responsibility of the bottle supplier to verify that the cleaning procedures actually used satisfy the quality control requirements set forth in Section 3.4.

3.3.1 Cleaning Procedure for Container Types: A, E, F, G, H, J, K

Sample Type: Extractable Organics (Types A, E, F, G, H, J and K); and Metals (Types E, F, G, and J) in Soils and Water.

- a. Wash glass bottles, teflon liners, and caps with hot tap water using laboratory grade nonphosphate detergent.
- b. Rinse three times with tap water to remove detergent.
- c. Rinse with 1:1 nitric acid (reagent grade HNO₃, diluted with ASTM Type I deionized water).
- d. Rinse three times with ASTM Type I organic free water.
- e. Oven dry bottles, liners and caps at 105° - 125° C for one hour.
- f. Rinse with pesticide grade hexane or pesticide grade methylene chloride using 20 mL for 1/2 gallon container; 10 mL for 32-oz and 16- oz containers; and 5 mL for 8-oz and 4-oz containers.
- g. Oven dry bottles, liners and caps at 105° - 125° C for one hour.
- h. Allow bottles, liners, and caps to cool to room temperature in an enclosed contaminant-free environment.
- i. Place liners in lids and cap containers.
- j. Label each container with Lot number and pack in case.
- k. Label exterior of each case with Lot number.
- l. Store in contaminant-free area.

3.3.2 Cleaning Procedure for Container Types: B, D

Sample Type: Purgeable (Volatile) Organics.

- a. Wash glass vials, teflon-backed septa, teflon liners and caps in hot water using laboratory grade nonphosphate detergent.
- b. Rinse three times with tap water.
- c. Rinse three times with ASTM Type I organic-free water.
- d. Oven dry vials, caps, septa and liners at 105°C for one hour.
- e. Allow vials; caps, septa and liners to cool to room temperature in an enclosed contaminant-free environment.
- f. Seal 40 mL vials with septa (teflon side down) and cap.
- g. Place liners in lids and cap 120 mL vials.
- h. Label each vial with Lot number and pack in case.
- i. Label exterior of each case with Lot number.
- j. Store in contaminant-free area.

A continuing calibration standard, prepared from a different stock solution than that used for preparation of the calibration standards, is prepared and analyzed after each ten samples or each two hours of continuous operation. The value of the continuing calibration standard concentration must agree within $\pm 10\%$ of the initial value or the appropriate corrective action is taken which may include recalibrating the instrument and reanalyzing the previous ten samples.

For the ICP, linearity near the quantitation limit will be verified with a standard prepared at a concentration of two times the quantitation limit. This standard must be run at the beginning and end of each sample analysis run or a minimum of twice per 8-hour period.

5.4 STANDARD OPERATING PROCEDURES

The analytical laboratory should prepare their own laboratory specific Standard Operating Procedures (SOPs) for the USEPA SW-846 sample preparation, cleanup, and analysis procedures employee to generate data for the Program. Each SOP should specify, as applicable, the:

- procedures for sample preparation;
- instrument start-up and performance checks;
- procedures to establish the actual and required detection limits for each parameter;
- initial and continuing calibration check requirements;
- specific methods for each sample matrix type; and
- required analyses and QC acceptance limits for method blanks, trip blanks (as appropriate), field blanks, matrix spikes, matrix spike duplicates, and laboratory control samples (USEPA or National Institute of Standards Technology (NIST) reference samples of laboratory prepared blank/spikes).

TABLE 5-1
PREPARATION METHODS FOR ORGANIC ANALYTES

	Phenols	Acids	Phthalate Esters	Nitro aromatic & Cyclic Ketones	Polynuclear Aromatic Hydrocarbons	Chlorinated Hydrocarbons	Base/Neutral
Aqueous	3510 3520	3510 3520	3510 3520	3510 3520	3510 3520	3510 3520	3510 3520
pH ²	≤2	≤2	Neutral	5-9	Neutral	Neutral	>11
Solids	3540 3550 3580 ¹	3540 3550 3580 ¹	3540 3550 3580 ¹	3540 3550 3580 ¹	3540 3550 3580 ¹	3540 3550 3580 ¹	3540 3550 3580 ¹

	Organophosphorus Pesticides	Organochlorine Pesticides & PCBs	Chlorinated Herbicides	Halogenated Volatiles	Non-Halogenated Volatiles	Aromatic Volatiles	Acrolein Acrylonitrile Acetonitrile	Volatile Organics
Aqueous	3510 3520	3510 3520	8150	5030	5030	5030	5030	5030
pH ²	6-8	5-9	≤2					
Solids	3540 3550 3580 ¹	3540 3550 3580 ¹	8150 3580 ¹	5030	5030	5030	5030	5030

1 Waste dilution, Method 3580, is only appropriate if the sample is soluble in the specified solvent.

2 pH at which extraction should be performed

TABLE 5-2
RECOMMENDED CLEANUP TECHNIQUES FOR INDICATED GROUPS OF COMPOUNDS

Analyte Group	Determinative Method ^a	Cleanup Method Option
Phenols	8040	3630 ^b , 3640, 3650, 8040 ^c
Phthalate esters	8060	3610, 3620, 3640
Nitrosamines	8070	3610, 3620, 3640
Organochlorine pesticides & PCB's	8080	3620, 3640, 3660
Nitroaromatics and cyclic ketones	8090	3620, 3640
Polynuclear aromatic hydrocarbons	8100	3611, 3630, 3640
Chlorinated hydrocarbons	8120	3620, 3640
Organophosphorus pesticides	8140	3620
Chlorinated herbicides	8150	8150 ^d
Priority pollutant semivolatiles	8250, 8270	3640, 3650, 3660
Petroleum waste	8250, 8270	3611, 3650

- ^a The GC/MS Methods, 8250 and 8270, are also appropriate determinative methods for all analyte groups, unless lower detection limits are required.
- ^b Cleanup applicable to derivatized phenols.
- ^c Method 8040 includes a derivatization technique followed by GC/ECD analysis, if interferences are encountered using GC/FID.
- ^d Method 8150 incorporates an acid-base cleanup step as an integral part of the method.

6.0 DATA REDUCTION, VALIDATION, AND REPORTING

In the Pre-Notice Site Cleanup Program (Program) the laboratory generated analytical data must be checked for precision, accuracy, and completeness. The Program participant and the analytical laboratory have the responsibility of assuring that the analytical data submitted to the Agency meets the Program's precision, accuracy, and completeness objectives. In addition the Agency's Project Managers will, at their discretion, have the Division of Laboratories, Quality Assurance Section review data for compliance with the QA requirements contained in this document. In order to facilitate the Agency's review and acceptance of laboratory analytical data, it is the responsibility of the participant to report laboratory data to the Agency in the standard format (specified in Appendix A) using Agency defined criteria for data reduction, validation and reporting. This section of the Program's Analytical Quality Assurance Plan details the requirements for reduction, validation and reporting of laboratory data.

6.1 LABORATORY DATA REDUCTION

The laboratory data reduction from raw data to finished result is to be performed according to the directions contained in Section 7.0 of the applicable USEPA SW-846 methods used for sample analysis. Aqueous sample results are to be reported in micrograms per Liter ($\mu\text{g/L}$). Solid sample results are to be reported in micrograms per Kilogram ($\mu\text{g/Kg}$) on a dry weight basis. The reported results must not be corrected for any blank results (i.e. no reporting blank subtracted data). Appendix A to this AQAP contains the forms and procedures that must be used for reporting Program laboratory data to the Agency.

6.2 LABORATORY DATA VALIDATION

6.2.1 Routine Laboratory Data Validation

The laboratory will perform in-house analytical data validation under the direction of the laboratory QA Officer or laboratory Director. The laboratory QA Officer or laboratory Director is responsible for assessing data quality and advising of any data which were rated "preliminary", "estimated", or "unacceptable" or other notations which would caution the data user of possible unreliability. Data validation by the laboratory should be conducted as follows:

- o Raw data produced by the analyst is turned over to the respective area supervisor.
- o The area supervisor reviews the data for attainment of quality control criteria as outlined in Sections 2.0 and 7.0 of this document and for overall reasonableness.
- o Upon acceptance of the raw data by the area supervisor, a report is generated and sent to the laboratory QA Officer or laboratory Director.

- o The laboratory QA Officer or laboratory Director will complete a thorough audit of reports.
- o The QA Officer or laboratory Director and area supervisors will decide whether any sample reanalysis is required.
- o Upon acceptance of the preliminary reports by the QA Officer, final reports will be generated and signed by the Laboratory Project Manager. The laboratory package shall be presented in the same order in which the samples were analyzed. The laboratory package must contain all the required forms as specified in Appendix A and the appropriate data flags as defined below.

The laboratory will prepare and retain full analytical and QC documentation. Including but not limited to, raw data system printouts (or legible photocopies) identifying date of analyses, analyst, parameters determined, calibration curve, calibration verifications, method blanks, sample and any dilutions, sample duplicates, spikes and control samples. As needed, the laboratory shall supply a hard copy of the retained information.

6.2.2 Non-Routine Laboratory Data Validation

Data submitted to the Agency in support of a request for a change or modification of the Agency's Program quality assurance objectives (see Section 2.5) must undergo additional validation by the laboratory. The additional validation consists of indicating the likely bias as compared to the Program quality assurance objectives. The additional non-routine data qualification flags and the criteria for their use are listed in Tables 6-1, 6-2, and 6-3. The data reporting forms must be completed as instructed in Appendix A and then the data qualification flags from Table 6-1 added to the forms. The data reported in support of the request must have sufficient supporting documentation to allow the Agency's Division of Laboratories, Quality Assurance Section (QAS) to review the request and advise the Agency's Project Manager of the validity of the request for change or modification of the Agency's Program quality assurance objectives.

6.2.3 Agency Data Validation

The Agency's Project Manager may at their discretion request the QAS to review any and/or all data submitted to the Agency for a Program site. The QAS will review and validate the data for compliance with this Analytical Quality Assurance Program and for suitability as Level IIIA or IIIB data. The QAS will issue a validation findings report to the Agency's Project Manager. The Agency's Project Manager will inform the Program participant of any required corrective actions, if any.

6.3 LABORATORY DATA REPORTING

The laboratory will report the data in the same chronological order in which it analyses along with QC data. The laboratory will provide the following information to the Program participant in each analytical data package submitted:

1. Cover sheets listing the samples included in the report and narrative comments describing problems encountered in analysis.
2. Tabulated results of inorganic and organic compounds identified and quantified, including the data flags (see sections 6.2.1 and 6.2.2 above).
 - A. The routine laboratory-provided data flags for organic analyses will include :
 - U - The analyte was analyzed for but not detected (i.e. less than detection/reporting limit). The sample quantitation limit must be corrected for dilution and for percent moisture.
 - J - Indicates an estimated concentration. Use when estimating a concentration of a tentatively identified compound, or if reporting a result that is less than the required quantitation limit. Also to be used when reporting data which does not meet quality control performance criteria during analyses (e.g. spike recovery outside of control limits).
 - B - This flag is used when the analyte is found in the associated blank as well as in the sample. It indicates possible / probable blank contamination and warns the data user to take appropriate action.

Appendix A of this Analytical Quality Assurance Plan contains the forms to be used by the laboratory to report data for the Program. The above described flags must be used. The laboratory may choose to use additional data flags for organic analyses, however, the laboratory must provide detailed definitions of the additional flags used.

- B. The routine laboratory-provided data flags for inorganic analyses will include :
 - U - The analyte was analyzed for but not detected (i.e. less than detection/reporting limit). The sample quantitation limit must be corrected for dilution and for percent moisture.
 - ~~J -~~ Indicates an estimated concentration. Use when reporting data which does not meet quality control performance criteria during analyses (e.g. spike recovery outside of control limits).
 - B - This flag is used when the analyte is found and the laboratory reported result is less than the required quantitation limit.

Appendix A of this Analytical Quality Assurance Plan contains the forms to be used by the laboratory to report data for the Program. The above described flags must be used. The laboratory may choose to use additional data flags for inorganic analyses, however, the laboratory must provide detailed definitions of the additional flags used.

- C. The non-routine laboratory data flags for organic and inorganic analyses are detailed in Tables 6-1 through 6-3.
3. Analytical results for QC sample spikes, sample duplicates, initial and a continuous calibration verifications of standards and blanks, standard procedural blanks, laboratory control samples and ICP interference check samples. For organic analyses, the data packages must include matrix spikes, matrix spike duplicates, and surrogate spike recoveries. The data package will be reported to the Agency for assessment. Appendix A of this Analytical Quality Assurance Plan contains the forms to be used by the laboratory to report data for the Program.
 4. Tabulation of instrument detection limits determined in pure water.

Appendix A of this Analytical Quality Assurance Plan contains the forms to be used by the laboratory to report data for the Program. Appendix A also contains instructions for filling out and completing the forms (exclusive of data flagging which must be accomplished per this section of the Analytical Quality Assurance Program). The use of commercial form generating software is acceptable as long as the required flags are provided when data is reported. Reporting data with flags written by hand upon software generated forms is acceptable.

Table 6-1 Non - Routine Data Flags Organic Analyses by GC/MS		
Parameter & Criteria	Actions	Data Flag
Holding times, exceeded	All associated samples	L
Mass Calibration Ion Abundance, not met	All associated data	P
Calibrations		
- initial, Ave RRF <0.05	Analyte Specific, positive results	L
- initial, %RSD >30%	Analyte Specific, positive results	P
- continuing, Ave RRF <0.05	Analyte Specific, positive results	L
- continuing, %D >25%	Analyte Specific, positive results	P
Blanks, results between DL and RQL	Analyte Specific	H
Surrogates,		
- If %R low but >25%	Fraction Specific	L
- If %R <25%	Fraction Specific	R
- If %R High	Fraction Specific	H
Internal Standards, IS area count outside -50% or +100% of associated standard	Associated analytes	P
Laboratory Control Samples, Recoveries		
- % Recovery High	Associated samples	H
- % Recovery Low, but >50%	Associated samples	L
- % Recovery <50%	Associated samples	R
Duplicates, Differences		
- % Differences High	Associated samples	P
Matrix Spikes, Recoveries		
- % Recovery High	Associated samples	H
- % Recovery Low, but >40%	Associated samples	L
- % Recovery <40%	Associated samples	R

Data Flags

- L = Low: The associated result may underestimate the true value
H = High: The associated result may overestimate the true value
P = Precision: The associated result may be of poor precision (high variability)
R = Rejected: The associated result should be rejected for making critical decisions and determinations

Table 6-2 Non-Routine Data Flags Organic Analyses by GC or HPLC		
Parameter & Criteria	Actions	Data Flags
Holding times, exceeded	All associated samples	L
Instrument Performance Checks		
- Required % Recoveries not met	All associated data	L or H
- Required RPD or %Difference not met	All associated data	P
Calibrations		
- initial, linearity criteria not met	Associated positive data	P
- continuing, % Difference between calibration factors criteria not met	Associated positive data	P
Surrogates		
- If %R low but >25%	Fraction specific	L
- If %R <25%	Fraction specific	R
- If %R High	Fraction specific	H
Laboratory Control Samples, Recoveries		
- % Recovery High	Associated samples	H
- % Recovery Low, but >50%	Associated samples	L
- % Recovery <50%	Associated samples	R
Duplicates, Differences		
- % Differences High	Associated samples	P
Matrix Spikes, Recoveries		
- % Recovery High	Associated samples	H
- % Recovery Low, but >40%	Associated samples	L
- % Recovery <40%	Associated samples	R

Data Flags

- L = Low: The associated result may underestimate the true value
H = High: The associated result may overestimate the true value
P = Precision: The associated result may be of poor precision (high variability)
R = Rejected: The associated result should be rejected for making critical decisions and determinations

Table 6-3 Non-Routine Data Flags Inorganic Analyses		
Parameter & Criteria	Actions	Data Flag
Holding times, exceeded	All associated samples	L
Calibrations,		
- initial, correlation coefficient unacceptable	Associated samples	P
- continuing criteria not met, %R high	Associated samples	H
- continuing criteria not met, %R low	Associated samples	L
ICS (for ICP), Recoveries		
- % Recovery High	Associated samples	H
- % Recovery Low, but >50%	Associated samples	L
- % Recovery <50%	Associated samples	R
Laboratory Control Samples, Recoveries		
- % Recovery High	Associated samples	H
- % Recovery Low, but >50%	Associated samples	L
- % Recovery <50%	Associated samples	R
Duplicates, Differences		
- % Differences High	Associated samples	P
Matrix Spikes, Recoveries		
- % Recovery High	Associated samples	H
- % Recovery Low, but >40%	Associated samples	L
- % Recovery <40%	Associated samples	R

Data Flags

- L = Low: The associated result may underestimate the true value
H = High: The associated result may overestimate the true value
P = Precision: The associated result may be of poor precision (high variability)
R = Rejected: The associated result should be rejected for making critical decisions and determinations

7.0 INTERNAL QUALITY CONTROL CHECKS

To ensure the production of analytical data of known and documented quality there are two types of quality assurance that should be used by the laboratory conducting analyses for Pre-Notice Site Cleanup Program (Program) projects. The two types are program quality assurance and analytical quality control.

The laboratory should have a written Quality Assurance/Quality Control (QA/QC) program which provides rules and guidelines to ensure the reliability and validity of work conducted at the laboratory. Compliance with the QA/QC program should be coordinated and monitored by a laboratory Quality Assurance Officer, which is independent of the operating departments.

This section of the Program's Analytical Quality Assurance Plan addresses the specific QC checks to apply to laboratory analytical activities in order to meet the Program's QA objectives (see Section 2.0 of this document).

7.1 DEFINITIONS OF QUALITY CONTROL CHECKS USED IN PRE-NOTICE PROGRAM

7.1.1 Laboratory Duplicates

Samples are analyzed in duplicate at the specified frequency in order to evaluate laboratory precision for a particular sample matrix. Duplicate samples are prepared by processing two distinct sample aliquots, from a single environmental sample, through the entire analytical process, beginning with sample extraction/digestion all the way to sample reporting. Duplicates are not to be confused with replicates, replicates refer to repetitive analyses of a single sample extract/digest.

7.1.2 Laboratory Matrix Spikes

Matrix Spike samples are used to assess the ability of the laboratory to recover target analytes from a particular sample matrix. In the absence of severe matrix interferences, the analysis of matrix spikes provide information on method accuracy. Matrix Spikes are prepared by adding a known concentration of one or more target analytes to an aliquot of environmental sample, and then processing the samples through each step of the preparation and analysis systems.

7.1.3 Laboratory Spiked Blanks

Laboratory Spiked Blanks are used to provide a measure of the analytical performance in the absence of any matrix related interferences. The samples are prepared by adding known concentrations of target analytes to an aliquot of laboratory reagent water, and then processing the sample through each step of the preparation and analysis systems.

7.1.4 Surrogate Spikes

Surrogates are associated with sample analyses for organic constituents. Surrogate compounds can be either, environmentally "rare" analytes similar to actual method analytes or method analytes that are not target analytes for the project. For GC/MS analyses, surrogates are typically deuterated analogs of actual target analytes. Surrogates are added to all samples (including other QC samples) for GC, GC/MS, HPLC, or HPLC/MS analysis prior to any preparation (extraction, purge) step. The recovery of surrogates provides an indication of target analyte recovery from a particular matrix by a particular analytical technique.

7.1.5 Method Blanks

Method Blanks provide an indication of laboratory internal contamination. Method Blanks consist of an aliquot of laboratory reagent water processed through all steps of the analytical preparation and analysis system. If field blanks and Method Blanks show similar types and concentrations of contaminants, the source of the contamination is most likely the laboratory.

7.1.6 Standard Reference Materials

Standard Reference Materials (SRMs) are materials of known composition and concentration that are obtained from a commercial vendor. Many SRMs are traceable to either the U.S.EPA or the National Institute of Standards and Technology (formerly NBS). SRMs are used for verification of calibration standards and associated calibrations and general troubleshooting.

7.1.7 Independent Check Standards

Independent Check Standards are standards prepared by the laboratory from a source different than the source from which the calibration standards are prepared (i.e. second source standard). Independent Check Standards are used for verification of calibration standards and associated calibrations and general troubleshooting.

7.2 ORGANIC QUALITY CONTROL CHECK ANALYSES

Organic analyses for Program projects require the use Laboratory Duplicates, Matrix Spikes, Spike Blanks, Surrogates, and Method Blanks.

7.2.1 Spiking Requirements

7.2.1.1 Matrix Spikes / Matrix Spike Duplicates

The requirement for Laboratory Duplicates and Matrix Spikes will be accomplished by the analysis of Matrix Spike/Matrix Spike Duplicates. These are matrix spikes prepared in duplicate, from the same environmental sample. For Level IIIA the analysis of Matrix Spike

/Matrix Spike Duplicates will be at a frequency of one per 20 or fewer samples. For Level IIIB the analysis of Matrix Spike / Matrix Spike Duplicates will be at a frequency of one per ten or fewer samples per matrix.

The requirement for Matrix Spike / Matrix Spike Duplicates will be accomplished by utilizing the Matrix Spike compounds recommended by the chosen analytical method. For those analytical methods which don't recommend Matrix Spike compounds, the laboratory must select compound(s) from the method analyte list. The number of Matrix Spike compounds spiked into the Matrix Spike / Matrix Spike Duplicate samples must be at a minimum of 10% of the number of target analytes (i.e. a Matrix Spike sample analyzed for one to ten target analytes by one analytical method must have a minimum of one Matrix Spike compound spiked into the sample, a sample analyzed for 11 to 20 target analytes by one analytical method must have a minimum of two Matrix Spike compounds spiked into the sample, etc.)

7.2.1.2 Surrogate Compounds

The requirement for Surrogates will be accomplished by utilizing the surrogate compounds recommended by the chosen analytical method. For those analytical methods which don't recommend surrogates, the laboratory must select compound(s) from the method analyte list which are not expected to be present in the environmental samples. The number of surrogate compounds spiked into each sample must be at a minimum of 10% of the number of target analytes (i.e. a sample analyzed for one to ten target analytes by one analytical method must have a minimum of one surrogate spiked into the sample, a sample analyzed for 11 to 20 target analytes by one analytical method must have a minimum two surrogate spiked into the sample, etc.)

7.2.2 Spiking Quantities

For Matrix Spike/Matrix Spike Duplicates, Spike Blanks, and Surrogates the quantity of the compounds spiked into the sample must result in a final concentration in the sample of 3 to 10 times the Required Quantitation Limits for Level IIIA analyses and 3 to 10 times the Estimated Quantitation Limits for Level IIIB analyses (see Tables 1-1 through 1-4 for Required Quantitation Limits for Level IIIA analyses and Table 1-5 for Estimated Quantitation Limits for Level IIIB analyses).

7.2.3 Organic QC Limits

The QC limits for Matrix Spike/Matrix Spike Duplicates, Spike Blanks, and Surrogates are contained in Tables 2-2 through 2-56. The spike recovery limits for Matrix Spikes, Spike Blanks and Surrogates are contained in the Accuracy column. The difference limits for the Matrix Spike/Matrix Spike Duplicates are contained in the Precision column.

For all blanks the QC limits are for the blank concentration to be less than the analytical methods Required Detection Limits.

7.3 INORGANIC QUALITY CONTROL CHECK ANALYSES

Inorganic analyses for Program projects require the use of Laboratory Duplicates, Matrix Spikes, Spike Blanks, Standard Reference Materials (SRMs) and Independent Checks Standards.

7.3.1 Spiking Requirements

The requirement for Matrix Spikes and Spiked Blanks for Level IIIA will be at a frequency of one per 20 or fewer samples. For Level IIIB the Matrix Spike and Spiked Blanks will be at a frequency of one per ten or fewer samples per matrix.

7.3.2 Spiking Quantities

For Matrix Spike and Spike Blanks the quantity of the analytes spiked into the sample must result in a final concentration in the sample of 3 to 10 times the Required Quantitation Limits for Level IIIA analyses and 3 to 10 times the Estimated Quantitation Limits for Level IIIB analyses (see Tables 1-1 through 1-4 for Required Quantitation Limits for Level IIIA analyses and Table 1-5 for Estimated Quantitation Limits for Level IIIB analyses).

7.3.3 Inorganic QC Limits

The QC limits for Laboratory Duplicates, Matrix Spikes, Spike Blanks, Standard Reference Materials (SRMs) and Independent Checks Standards are contained in Tables 2-2, 2-57 and 2-58.

The spike recovery limits for Matrix Spikes, and Spike Blanks are contained in the Accuracy column. The difference limits for the Laboratory Duplicates are contained in the Precision column. The QC limits for Standard Reference Materials (SRMs) and Independent Checks Standards is dependant upon the use of the Standard Reference Materials (SRMs) and Independent Checks Standards. Whenever the Standard Reference Materials (SRMs) and Independent Checks Standards are to be used for overall analytical precision the QC limits are contained in the Accuracy column of Tables 2-2, 2-57 and 2-58. Whenever the Standard Reference Materials (SRMs) and Independent Checks Standards are to be used to demonstrate or verify an acceptable calibration the QC limits are contained in section 5.0.

For all blanks the QC limits are for the concentration to be less than the analytical methods' Quantitation Limits.

~~WATER~~
~~ANALYSIS~~
~~RESULTS~~

8.0 PERFORMANCE AND SYSTEMS AUDITS

Performance and system audits are conducted as a systematic check to determine the quality of operation and to monitor the capability and performance of the laboratory analytical systems. A performance audit independently collects measurement data using performance evaluation samples. Performance audits are quantitative in nature. A system audit consists of a review of the total data production process. A system audit includes on-site review of the laboratory's operational systems and physical facilities. System audits are qualitative in nature.

8.1 INTERNAL AUDITS

The internal performance and system audits of the laboratory should be conducted by the laboratory QA Officer and/or laboratory Director.

8.1.1 Internal Performance Audits

For Pre-Notice Site Cleanup Program (Program) projects the laboratory QA Officer and/or laboratory Director should submit blind QC samples along with project samples to the laboratory for analysis. The QA Officer should evaluate the analytical results of these blind performance samples to ensure the laboratory maintain a good performance.

8.1.2 Internal Systems Audits

For Program projects the laboratory QA Officer and/or laboratory Director should perform system audits, which will include examination laboratory documentation on sample receiving, sample log-in, sample storage, chain of custody procedure, sample preparation and analysis, instrument operating records, etc.

8.2 EXTERNAL AUDITS

8.2.1 External Performance Audits

For Program projects the laboratory is encouraged to participate in external performance audits. The performance audits should consist of the analysis of independent or commercial check samples and participation in the USEPA's performance evaluation sample surveys for ongoing assessment of laboratory precision and accuracy. The analytical results of the analysis of performance evaluation samples are to ensure the laboratory maintain a good performance. The performance audits should be conducted on a quarterly basis. All information generated from performance evaluation sample programs should be made available during systems audits or upon request.

8.2.2 External Systems Audits

For Program projects an external systems audit is an on-site inspection and review of a laboratory's quality control system by the Agency Project Manager or their designate (Division Of Laboratories/ Quality Assurance Section (QAS) personnel). At the Agency Project Manager's discretion the system audits, will include examination of laboratory documentation on sample receiving, sample log-in, sample storage, chain of custody procedures, sample preparation and analysis, records control, instrument operating records, etc. The systems audit will determine whether the laboratory is adhering to this Analytical Quality Assurance Program and what level(s) of data the laboratory is capable of generating.. The QAS will issue an audit findings report to the Agency Project Manager. The external systems audits and findings report apply only to the Pre-Notice Site Cleanup Program, they do not constitute a formal certification or endorsement by the Illinois EPA nor are they applicable to other Agency Programs.

9.0 CALCULATIONS OF DATA QUALITY INDICATORS

A laboratory generating data for Pre-Notice Site Cleanup Program (Program) projects must assess their laboratory results for compliance with required precision, accuracy, completeness and sensitivity as follows:

9.1 PRECISION

Precision of laboratory analysis will be assessed by comparing the analytical results between matrix spike/matrix spike duplicate (MS/MSD) for organic analysis, and laboratory duplicate analyses for inorganic analysis. The relative percent difference (%RPD) will be calculated for each pair of duplicate analysis using the Equation 9-1.

$$\%RPD = \frac{S - D}{(S + D)/2} \times 100 \quad \text{Equ. 9-1}$$

Where: S = First sample value (original or MS value)

D = Second sample value (duplicate or MSD value)

9.2 ACCURACY

Accuracy of laboratory results will be assessed for compliance with the established QC criteria that are described in Section 2.0 of this Analytical Quality Assurance Program using the analytical results of method blanks, reagent/preparation blank, matrix spike/matrix spike duplicate samples, field blank, and bottle blanks. The percent recovery (%R) of matrix spike samples will be calculated using Equation 9-2.

$$\%R = \frac{A - B}{C} \times 100 \quad \text{Equ. 9-2}$$

Where:

A = The analyte concentration determined experimentally from the spiked sample;

B = The background level determined by a separate analysis of the unspiked sample and;

C = The amount of the spike added.

9.3 COMPLETENESS

The data completeness of laboratory analyses results will be assessed for compliance with the amount of data required for decision making. The completeness is calculated using Equation 9-3.

$$\text{Completeness} = \frac{\text{valid analyses reported}}{\text{total analyses requested}} \times 100 \quad \text{Equ. 9-3}$$

9.4 SENSITIVITY

The achievement of method detection limits depend on instrumental sensitivity and matrix effects. Therefore it is important to monitor the instrumental sensitivity to ensure the data quality through constant instrument performance. The laboratory should monitor instrumental sensitivity through the analysis of method blank, calibration check sample, and laboratory control samples, etc.

10.0 CORRECTIVE ACTIONS

For Pre-Notice Site Cleanup Program (Program) projects the laboratory should have a written SOP specifying that corrective actions are required whenever an out-of-control event or potential out-of-control event is noted. The corrective action taken is somewhat dependent on the analysis and the event. The SOP should document the corrective action and notification by the analyst about the errors and corrective procedures.

Laboratory personnel are alerted that corrective actions may be necessary if:

- o QC data are outside the warning or acceptable windows for precision and accuracy;
- o Blanks contain target analytes above acceptable levels;
- o Undesirable trends are detected in spike recoveries or RPD between duplicates;
- o There are unusual changes in detection limits;
- o Deficiencies are detected by the QA Department during internal or external audits or from the results of performance evaluation samples; or
- o Inquiries concerning data quality are received.

Corrective action procedures are often handled at the bench level by the analyst, who reviews the preparation or extraction procedure for possible errors, checks the instrument calibration, spike and calibration mixes, instrument sensitivity, and so on. If the problem persists or cannot be identified, the matter is referred to the laboratory supervisor, manager and/or QA department for further investigation. Once resolved, full documentation of the corrective action procedure is filed with the QA department.

For data submitted to the Agency which does not meet the Quality Assurance Objectives for the Program, corrective action may include:

- Re-analyzing the samples, if holding time criteria permits;
- Resampling and analyzing, and/or;
- Evaluating and amending analytical procedures; and/or,
- Accepting data and acknowledging the level of uncertainty.

SECRET

SECRET

Appendix A

INORGANIC REPORTING FORM INSTRUCTIONS

FORM I - INORGANIC ANALYSIS DATA SHEET: This form is used to tabulate and report sample analysis results for target analytes.

Complete the header information.

"Date Received" is the date (formatted MM/DD/YY) of sample receipt at the laboratory.

"% Solids" is the percent of solids on a weight/weight basis in the sample as determined by drying the sample. Report percent solids to one decimal place. If the percent solids is not required because the sample is fully aqueous or less than 1% solids, then enter "0.0".

Enter the appropriate concentration units ($\mu\text{g/L}$ for water or mg/Kg dry weight for soil).

Under the column labeled "Concentration", enter for each analyte either the value of the result or the Acceptable Quantitation Limit for the analyte corrected for any dilutions and/or percent moisture in soil samples.

FORM I-IN includes fields for three types of result flags. These flags must be completed as follows:

- C (Concentration) flag: Enter the flag as specified in section 6.3 of the Analytical Quality Assurance Plan (AQAP)
- Q (Qualification) flag: Enter the flag as specified in section 6.3 of the Analytical Quality Assurance Plan (AQAP).
- M (Method) flag: Enter the USEPA analytical Method Number used to obtain the results for the reported analytes:

FORM II - INORGANIC INITIAL AND CONTINUING CALIBRATION VERIFICATION: This form is used to report analyte recoveries from calibration solutions.

Complete the header information.

Under "Initial Calibration True", enter the value (in $\mu\text{g/L}$, to one decimal place) of the concentration of each analyte in the Initial Calibration Verification Solution.

Under "Initial Calibration Found", enter the most recent value (in $\mu\text{g/L}$, to one decimal place), of the concentration of each analyte measured in the Initial Calibration Verification Solution.

Under "Initial Calibration %R", enter the value (to one decimal place) of the percent recovery computed according to the following equation:

$$\%R = \frac{\text{Found (ICV)}}{\text{True (ICV)}} \times 100$$

where; True (ICV) is the true concentration of the analyte in the Initial Calibration Verification Solution and Found (ICV) is the found concentration of the analyte in the Initial Calibration Verification Solution.

Under "Continuing Calibration True", enter the value (in µg/L, to one decimal place) of the concentration of each analyte in the Continuing Calibration Verification Solution.

Under "Continuing Calibration Found", enter the value (in µg/L, to one decimal place) of the concentration of each analyte measured in the Continuing Calibration Verification Solution.

Note that the form contains two "Continuing Calibration Found" columns. The column to the left must contain values for the first Continuing Calibration Verification, and the column to the right must contain values for the second Continuing Calibration Verification. The column to the right should be left blank if no second Continuing Calibration Verification was performed.

Under "Continuing Calibration %R", enter the value (to one decimal place) of the percent recovery computed according to the following equation:

$$\%R = \frac{\text{Found (CCV)}}{\text{True (CCV)}} \times 100$$

where; True (CCV) is the true concentration of each analyte, and Found (CCV) is the found concentration of the analyte in the Continuing Calibration Verification Solution.

Note that the form contains two "Continuing Calibration %R" columns. Entries to these columns must follow the sequence detailed above for entries to the "Continuing Calibration Found" columns.

Under "M", ~~enter the~~ USEPA number of the appropriate method used to obtain the results

~~Enter the~~
The order of reporting ICV's and CCV's for each analyte must follow the temporal order in which the standards were run starting with the first Form II and moving from the left to the right continuing to the subsequent Form IIs as appropriate.

FORM III-INORGANIC BLANKS: This form is used to report analyte concentrations found in the Initial Calibration Blank (ICB), in Continuing Calibration Blanks (CCB), and in the Preparation Blank (PB).

Complete the header information.

According to the matrix specified for the Preparation Blank, circle " $\mu\text{g/L}$ " (for water) or " mg/Kg " (for soil) as the Preparation Blank concentration units. If results for more than one matrix are being reported in the data package, then the Preparation Blank results for each matrix must be reported on separate Form IIIs.

Under "Initial Calibration Blank", enter the concentration (in $\mu\text{g/L}$, to one decimal place) of each analyte in the most recent Initial Calibration Blank.

Under the "C" flag field, for any analyte enter "U" or "B" as appropriate and defined in section 6.3 of the AQAP.

Under "Continuing Calibration Blank 1", enter the concentration (in $\mu\text{g/L}$, to one decimal place) of each analyte detected in the first required Continuing Calibration Blank (CCB) analyzed after the Initial Calibration Blank. Enter any appropriate flag, as explained for the "Initial Calibration Blank", to the "C" flag column immediately following the "Continuing Calibration Blank 1" column.

If only one Continuing Calibration Blank was analyzed, then leave the columns labeled "2" and "3" blank. If up to three CCB's were analyzed, complete the columns labeled "2" and "3", in accordance with the instructions for the "Continuing Calibration Blank 1" column. If more than three Continuing Calibration Blanks were analyzed, then complete additional FORMs III-IN as appropriate.

Under "Preparation Blank", enter the concentration in $\mu\text{g/L}$ (to one decimal places) for a water blank or in mg/kg (to two decimal places) for a soil blank, of each analyte in the Preparation Blank. Enter any appropriate flag, as explained for the "Initial Calibration Blank", to the "C" flag column immediately following the "Preparation Blank" column.

For all blanks, enter the concentration of each analyte (positive or negative) measured above the Acceptable Quantitation Limit (AQL) or below the negative value of the AQL.

Under "M", enter the USEPA number of the appropriate method used to obtain the results

The order of reporting ICB's and CCB's for each analyte must follow the temporal order in which the blanks were run starting with the first Form III and moving from left to right and continuing to the following Form III's.

FORM IV-INORGANIC ICP INTERFERENCE CHECK SAMPLE: This form is used to report Interference Check Sample (ICS) results for each ICP instrument.

Complete the header information..

Under "True Sol. A", enter the true concentration of each analyte present in Solution A.

Under "True Sol. AB", enter the true concentration of each analyte present in Solution AB.

Under "Initial Found Sol. A", enter the concentration of each analyte found in the initial analysis of Solution A.

Under "Initial Found Sol. AB", enter the concentration of each analyte in the initial analysis of Solution AB.

Under "Initial Found %R", enter the value of the percent recovery computed for true solution AB greater than zero according to the following equation:

$$\%R = \frac{\text{Initial Found Sol. AB}}{\text{True Sol. AB}} \times 100$$

Under "Final Found Sol. A", enter the concentration of each analyte found in the final analysis of Solution A.

Under "Final Found Sol. AB", enter the concentration of each analyte found in the final analysis of Solution AB.

Under "Final Found %R", enter the value of the percent recovery computed according to the following equation:

$$\%R = \frac{\text{Final Found Sol. AB}}{\text{True Sol. AB}} \times 100$$

If more ICS analyses were required, submit additional FORM IVs as appropriate.

The order of reporting ICSs for each analyte must follow the temporal order in which the standards were run starting with the first Form IV and continuing to the following Form IV's as appropriate.

FORM V INORGANIC SPIKE SAMPLE RECOVERY: This form is used to report results for the pre-digest spike.

Complete the header information.

Under "Control Limit %R", enter the QC limits as specified in section 7.3 of the AQAP.

Under "Spiked Sample Result (SSR)", enter the measured value, in appropriate units, for each relevant analyte in the matrix spike sample. Enter any appropriate flag, to the "C" flag column immediately following the "Spiked Sample Result (SSR) column.

Under "Sample Result (SR)", enter the measured value for each required analyte in the sample on

which the matrix spike was performed. Enter any appropriate flag, to the "C" flag column immediately following the "Sample Result (SR)" column.

Under "Spike Added (SA)", enter the value for the concentration of each analyte added to the sample. The same concentration units must be used for spiked sample results, unspiked (original sample) results, and spike added sample results.

Under "%R", enter the value of the percent recovery for all spiked analytes computed according to the following equation:

$$\%R = \frac{(SSR - SR)}{SA} \times 100$$

%R must be reported, whether it is negative, positive or zero.

Under "Q", enter "J" if the Spike Recovery (%R) is out of the control limits.

If different samples were used for spike sample analysis of different analytes, additional FORM Vs must be submitted for each sample as appropriate.

FORM VI INORGANIC DUPLICATES: The duplicates form is used to report results of duplicate analyses. Duplicate analyses are required for % solids values and all analyte results.

Complete the header information.

For "% Solids for Sample", enter to percent solids for the original sample of the Sample Number reported on the form.

Under "Control Limit", enter the QC limits as specified in section 7.3 of the AQAP. If the sample and duplicate values were less than the AQL leave the field empty.

Under Sample (S), enter the original measured value for the concentration of each analyte in the sample on which a Duplicate analysis was performed. Concentration units are those specified on the form. Enter any appropriate flag, to the "C" flag column immediately following the "Sample (S)" column.

Under Duplicate (D), enter the measured value for each analyte in the Duplicate sample. Concentration units are those specified on the form. Enter any appropriate flag, to the "C" flag column immediately following the "Duplicate (D)" column.

Under RPD, enter the absolute value of the RPD for all analytes detected above the AQL in either the sample or the duplicate, computed according to the following equation:

$$RPD = \frac{(S-D)}{\left[\frac{S+D}{2} \right]} \times 100$$

The values for S and D must be exactly those reported on this form. A value of zero must be substituted for S or D if the analyte concentration is less than the reporting limit in either one. If the analyte concentration is less than the reporting limit in both S and D, leave the RPD field empty.

FORM VII - INORGANIC LABORATORY CONTROL SAMPLE: This form is used to report results for the solid and aqueous Laboratory Control Samples.

Complete the header information.

Under "Aqueous True", enter the value of the concentration of each analyte in the Aqueous LCS Standard Source.

Under "Aqueous Found", enter the measured concentration of each analyte found in the Aqueous LCS solution.

Under "Aqueous %R", enter the value of the percent recovery computed according to the following equation:

$$\%R = \frac{\text{Aqueous LCS Found}}{\text{Aqueous LCS True}} \times 100$$

Under "Solid True", enter the value of the concentration of each analyte in the Solid LCS Source.

Under "Solid Found", enter the measured value of each analyte found in the Solid LCS solution.

Under "C", enter "B" or "U" as specified in the AQAP or leave empty, to describe the found value of the solid LCS.

Under "Limits", enter the QC limits as specified in section 7.3 of the AQAP.

Under "Solid %R", enter the value of the percent recovery computed according to the following equation:

$$\%R = \frac{\text{Solid LCS Found}}{\text{Solid LCS True}} \times 100$$

If the analyte concentration is less than the quantitation limit, a value of zero must be substituted for the solid LCS found.

Submit additional FORM VIIs as appropriate, if more than one aqueous LCS or solid LCS was required.

FORM VIII-INORGANIC ICP SERIAL DILUTION: This form is used to report results for serial dilution. The serial dilution should be used in accordance with Section 8 of USEPA SW-846 Method 7000A and Section 8 of USEPA SW-846 Method 6010A.

Complete the header information.

Under "Initial Sample Result (I)", enter the measured value for each analyte in the undiluted sample. Enter any appropriate flag to the "C" flag column immediately following the "Initial Sample Result (I)" column.

Under "Serial Dilution Result (S)", enter the measured concentration value for each analyte in the diluted sample. The value must be adjusted for that dilution. Enter any appropriate flag, to the "C" flag column immediately following the "Serial Dilution Result (S)" column.

Note that the Serial Dilution Result (S) is obtained by multiplying by the dilution factor the instrument measured value of the serially diluted sample and that the "C" flag for the serial dilution must be established based on the instrument measured value before correcting it for the dilution regardless of the value reported on the form.

Under "% Difference", enter the absolute value of the percent difference in concentration of required analytes, between the original sample and the diluted sample according to the following formula:

$$\% \text{ Difference} = \frac{(I - S)}{I} \times 100$$

A value of zero must be substituted for S if the analyte concentration is less than the AQL or Instrument Detection Limit. If the analyte concentration in (I) is less than the AQL or IDL concentration, leave the "% Difference" field empty.

Under "Q", enter Y if the % Difference is greater than 10% and the original sample concentration is greater than 50x the reporting limit or IDL, whichever is lower.

FORM IX - INORGANIC STANDARD ADDITION RESULTS: This form is used to report the results of samples analyzed using the Method of Standard Additions (MSA) for Furnace AA analysis. The MSA should be used in accordance with Section 8 of USEPA SW-846 Method 7000A and Section 8 of USEPA SW-846 Method 6010A.

Complete the headed information.

Under "Sample No.", enter the sample numbers of all analytical samples analyzed using the MSA. This includes reruns by MSA.

If additional samples require MSA, submit additional FORMs IX-IN. Samples must be listed in alphanumeric order per analyte, continuing to the next FORM IX-IN if applicable.

Under "Anlyt", enter the chemical symbol for each analyte for which MSA was required for each sample listed. The analytes must be in alphabetic listing of the chemical symbols.

Results for different samples for each analyte must be reported sequentially, with the analytes ordered according to the alphabetic listing of their chemical symbols.

Under "0 ADD ABS", enter the measured value in absorbance units for the analyte before any addition is performed.

Under "1 ADD CON", enter the final concentration in $\mu\text{g/L}$ of the analyte after the first addition to the sample analyzed by MSA.

Under "1 ADD ABS", enter the measured value of the sample solution spiked with the first addition.

Under "2 ADD CON", enter the final concentration in $\mu\text{g/L}$ of the analyte after the second addition to the sample analyzed by MSA.

Under "2 ADD ABS", enter the measured value of the sample solution spiked with the second addition.

Under "3 ADD CON", enter the final concentration in $\mu\text{g/L}$ of the analyte after the third addition to the sample analyzed by MSA.

Under "3 ADD ABS", enter the measured value of the sample solution spiked with the third addition.

Under "Final Conc.", enter the final analyte concentration in the sample as determined by MSA computed according to the following formula:

$$\text{Final Conc.} = -(x \text{ intercept})$$

Under "r", enter the correlation coefficient that is obtained for the least squares regression line representing the following points (x,y), (0.0, "0 ADD ABS"), ("1 ADD CON", "1 ADD ABS"), ("2 ADD CON", "2 ADD ABS"), and ("3 ADD CON", "3 ADD ABS").

Under "Q", enter "J" if r is less than 0.995. If r is greater than or equal to 0.995, then leave the field empty.

FORM X INORGANIC INSTRUMENT DETECTION LIMITS: This form is required only for Level IIIC reporting. This form documents the Instrument Detection Limits for each instrument that the laboratory used to obtain data for the Batch Group.

Complete the header information.

Under "IDL", enter the Instrument Detection Limit as determined by the laboratory for each analyte analyzed by the instrument.

Under "M", enter the method of analysis used to determine the instrument detection limit for each wavelength used.

Use additional FORM Xs if more instruments and wavelengths are used.

FORM XI INORGANIC PREPARATION LOG: This form is required only for Level IIIC reporting. This form is used to report the preparation run log. All field samples and all quality control preparations (including duplicates, matrix spikes, LCS's, PB's and re-preparations) associated with the batch group must be reported on FORM XI-INORGANIC.

Complete the header information. For "Prep. Method No.", enter the method for which the preparations listed on the Form were made. Note a separate Form XI must be submitted for each preparation method.

Under "Sample No.", enter the sample number of each sample in the batch, and of all other preparations such as duplicates, matrix spikes, LCSs, PBs, and re-preparations. All Sample numbers must be listed in ascending alphanumeric order, continuing to the next FORM XIs if applicable.

Under "Preparation Date", enter the date on which each sample was prepared for analysis by the method indicated in the header section of the Form.

Under "Weight", enter the wet weight of each soil sample prepared for analysis by the method indicated in the header section of the Form. If the sample matrix is water, then leave the field empty.

Under "Volume", enter the final volume of the preparation for each sample prepared for analysis by the method indicated in the header section of the Form. This field must have a value for each sample listed.

Field Sample No.

IEPA LPC No.:	SITE NAME:
Lab Name:	Batch No.:
Matrix: (soil/water)	Lab Sample ID:
Preparation Procedure #s:	Date Received
% Solids:	Date(s) Prep'd:
Date Hg Analyzed:	Date CN Analyzed:
IEPA Pre-Notice Cleanup Program Data Quality Level IIIA \ IIIB (circle one)	

[illegible]

IEPA LPC No.:	SITE NAME:
Lab Name:	ICP / Flame AA / GFAA / CVAA / CN by Spect. (CIRCLE the APPROPRIATE METHOD TYPE)
IEPA Pre-Notice Cleanup Program Data Quality Level IIIA \ IIIB (circle one)	

[illegible]

FORM XI
IEPA PRE-NOTICE SITE CLEANUP PROGRAM
INORGANIC PREPARATION LOG

IEPA LPC No.:	SITE NAME:
Lab Name:	Matrix (soil / water)
Prep. Method No.:	
IEPA Pre-Notice Cleanup Program Data Quality Level IIIA \ IIIB (circle one)	

[illegible]

IEPA LPC No.:	SITE NAME:
Lab Name:	Batch No.:
IEPA Pre-Notice Cleanup Program Data Quality Level IIIA \ IIIB (circle one)	

[illegible]

FORM III
IEPA PRE-NOTICE SITE CLEANUP PROGRAM
INORGANIC BLANK ANALYSIS DATA SHEET

IEPA LPC No.:	SITE NAME:
Lab Name:	Batch No.:
Preparation Blank Matrix (soil/water):	Preparation Blank Concentration Units ($\mu\text{g/L}$ or mg/Kg)
IEPA Pre-Notice Cleanup Program Data Quality Level IIIA \ IIIB (circle one)	

[illegible]

FORM IV
IEPA PRE-NOTICE SITE CLEANUP PROGRAM
INORGANIC ICP INTERFERENCE CHECK SAMPLE

IEPA LPC No.:	SITE NAME:
Lab Name:	Batch No.:
IEPA Pre-Notice Cleanup Program Data Quality Level IIIA \ IIIB (circle one)	

Concentration Units: ($\mu\text{g/L}$)[illegible]

FORM V
IEPA PRE-NOTICE SITE CLEANUP PROGRAM
INORGANIC SPIKE SAMPLE RECOVERY

IEPA LPC No.:	SITE NAME:
Lab Name:	Batch No.:
Lab Sample ID:	Concentration Units: ($\mu\text{g/L}$ or mg/Kg dry weight)
Matrix (soil/Water):	Sample % Solids:
IEPA Pre-Notice Cleanup Program Data Quality Level IIIA \ IIIB (circle one)	

[illegible]

FORM VI
IEPA PRE-NOTICE SITE CLEANUP PROGRAM
INORGANIC DUPLICATE SAMPLE RECOVERY

IEPA LPC No.:	SITE NAME:
Lab Name:	Batch No.:
Lab Sample ID:	Concentration Units: ($\mu\text{g/L}$ or mg/Kg dry weight)
Matrix (soil/Water):	Sample % Solids:
IEPA Pre-Notice Cleanup Program Data Quality Level IIIA \ IIIB (circle one)	

[illegible]

FORM VII
IEPA PRE-NOTICE SITE CLEANUP PROGRAM
INORGANIC LABORATORY CONTROL SAMPLE RECOVERY

IEPA LPC No.:	SITE NAME:
Lab Name:	Batch No.:
Lab Sample ID:	
IEPA Pre-Notice Cleanup Program Data Quality Level IIIA \ IIIB (circle one)	

[illegible]

IEPA LPC No.:	SITE NAME:
Lab Name:	Batch No.:
Lab Sample ID:	
IEPA Pre-Notice Cleanup Program Data Quality Level IIIA \ IIIB (circle one)	

Page ____ of ____

IEPA LPC No.:	SITE NAME:
Lab Name:	Batch No.:
IEPA Pre-Notice Cleanup Program Data Quality Level IIIA \ IIIB (circle one)	

[illegible]

ORGANIC REPORTING FORM INSTRUCTIONS

- A. ORGANIC ANALYSIS DATA SHEET (FORM I-ORGANIC): This form is used for tabulating and reporting sample analysis results for Organic compounds.

The laboratory must complete a Form I for each investigative sample, trip blank, method blank, matrix spike, matrix spike duplicate and laboratory control sample analyzed. The laboratory must complete a Form I for each analytical method used to analyze the sample. The results obtained by two analytical methods upon one sample can not be combined on one Form I.

Complete the header information on each page as required.

Under "% moisture not dec.", enter the nondecanted percent moisture.

"Date Received" is the date of sample receipt at the laboratory. It should be entered as MM/DD/YY.

"Date Extracted" and "Date Analyzed" should be entered in a similar fashion. The date of sample receipt should be compared with the extraction and analysis dates of each fraction to ensure that holding times were not exceeded.

If a sample has been diluted for analysis, enter the "Dilution Factor" as a single number, such as 100 for a 1 to 100 dilution of the sample. Enter 0.1 for a concentration of 10 to 1. If the sample was not diluted, enter 1.

Report the concentrations uncorrected for blank contaminants.

Report analytical results to two significant figures

The appropriate concentration units, ug/L or ug/kg, must be entered.

If the result is a value greater than or equal to the quantitation limit, report the value. If the result is less than the quantitation limit, report the value as indicated in Section 6.3 of the Analytical Quality Assurance Plan (AQAP).

Under the column labeled "Q" for qualifier, flag each result with the specific data flags as listed in Section 6.3 of the AQAP.

- B. SURROGATE RECOVERY (FORM II-ORGANIC): This FORM II is used to report the recoveries of the surrogate compounds added to each sample, blank, matrix spike, and matrix spike duplicate.

Complete the header information.

For each surrogate, report the percent recovery to the one significant figure using the following equation:

$$\% Recovery = \frac{\text{Concentration (or amount) Found}}{\text{Concentration (or amount) Found}} \times 100$$

At the bottom of the form indicate the surrogates used, list both the full name and the abbreviation used at the top of the columns. List the QC limits applied (listed in section 7.2 of the AQAP).

Flag each surrogate recovery outside the QC limits, listed in section 7.2 of the AQAP, with an asterisk (*). The asterisk must be placed in the last space in each appropriate column, under the "#" symbol. In the far righthand column, total the number of surrogate recoveries outside the QC limits for each sample. If no surrogates were outside the limits, enter "0".

If the surrogates are diluted out in any analysis, enter the calculated recovery or "0" if the surrogate is not detected; and flag the surrogate recoveries with a "D" in the column under the "#" symbol. Don't include results flagged "D" in the total number of recoveries for each sample outside the QC limits.

- C. MATRIX SPIKE/MATRIX SPIKE DUPLICATE RECOVERY (FORM III-ORGANIC): This form is used to report the results of the analyses of a matrix spike and matrix spike duplicate.

Complete the header information.

In the upper box in Form III, under "Spike Added", enter the calculated concentration in ug/L or ug/kg (according to the matrix) that results from adding each spiked compound to the aliquot chosen for the matrix spike (MS). For instance, if 100ug of spike are added to 1g of soil, the resulting concentration is 100,000 ug/kg. Enter the "Sample Concentration", in similar units, of each spike compound detected in the original sample. If a spike compound was not detected during the analysis of the original sample, enter the sample result as "0". Under "MS Concentration", enter the actual concentration of each spike compound detected in the matrix spike aliquot. Calculate the percent recovery of each spike compound in the matrix spike aliquot using the following equation:

$$\% R (\text{Matrix Spike}) = \frac{SSR - SR}{SA} \times 100$$

Report the recovery to the nearest whole percent, and enter under "MS % REC". Flag all percent recoveries outside the QC limits, listed in section 7.2 of the AQAP, with an asterisk (*). The asterisk must be placed in the last space of the percent recovery column, under the "#" symbol.

Complete the lower box of Form III in a similar fashion, using the results of the analysis of the matrix spike duplicate (MSD) aliquot. Calculate the relative percent difference (RPD) between the matrix spike recovery and the matrix spike duplicate recovery using the following equation:

$$RPD = \frac{|MSR - MSDR|}{\left(\frac{MSR + MSDR}{2} \right)} \times 100$$

and enter this value in the lower box under "%RPD". Compare the RPDs to the QC limits listed in section 7.2 of the AQAP, and flag each RPD outside the QC limits with an asterisk (*) in the last space of the "%RPD" column, under the "#" symbol.

Summarize the values outside the QC limits at the bottom of the page.

- D. METHOD BLANK SUMMARY (FORM IV-ORGANIC): This form summarizes the samples associated with each method blank analysis. A copy of the appropriate Form IV is required for each blank.

Complete the header information.

For volatile blanks, enter the method number of sample introduction procedure in the space provided for "Extraction Procedure No". For other method blanks, enter the extraction procedure number.

For all fractions, as appropriate, summarize the samples associated with a given method blank in the table below the header, entering the program participant (client) Sample Number, and Lab Sample ID. Enter the Lab File No. and time of analysis of each sample.

- E. GC/MS TUNING AND MASS CALIBRATION (FORM VA-ORGANIC AND FORM VB-ORGANIC): These forms are used to report the results of GC/MS tuning for volatiles and semivolatiles, and to summarize the date and time of analysis of samples, standards, blanks, matrix spikes, and matrix spike duplicates associated with each GC/MS tune.

Complete the header information. Enter the "Lab File ID" for the injection containing the GC/MS tuning compound (BFB for volatiles, DFTPP for semivolatiles). Enter the "Instrument ID". Enter the date and time of injection of the tuning compound. Enter the type of GC column used as "PACK" or "CAP", under "Column."

For each ion listed on the form, enter the percent relative abundance in the righthand column. Report relative abundances to the number of significant figures given for each ion in the ion abundance criteria column.

All relative abundances must be reported as a number. If zero, enter "0", not a dash or other non-numeric character. Where parentheses appear, compute the percentage of the ion abundance of the mass given in the appropriate footnote, and enter that value in the parentheses.

In the lower half of the form, list all samples, standards, blanks, matrix spikes, and matrix spike duplicates analyzed under that tune in chronological order, by time of analysis. Enter "Sample No.", "Lab Sample ID", "Lab File No.", "Date Analyzed", and "Time Analyzed" for all standards, samples,

blanks, matrix spikes, and matrix spike duplicates.

The GC/MS tune expires twelve hours from the time of injection of the tuning compound (BFB or DFTPP) listed at the top of the form. In order to meet the tuning requirements, a sample, standard, blank, matrix spike, or matrix spike duplicate must be injected within twelve hours of the injection of the tuning compound.

F. INITIAL CALIBRATION DATA (FORM VIA-ORGANIC AND VIB-ORGANIC):

After an analytical system has undergone an initial calibration, and after all initial calibration criteria have been met, the laboratory must complete and submit a Form VIA or VIB for each initial calibration performed which is relevant to the samples, blanks, matrix spikes, matrix spike duplicates in the delivery group, regardless of when that calibration was performed.

Complete all header information. If the calendar date changes during the calibration procedure, the inclusive dates should be given on the Form. Complete the response factor or calibration factor data for the calibration points, and then calculate and report the average relative response factor (RRF) or average calibration factor (CF) for all target and surrogate compounds. The laboratory must report the %RSD for all compounds. For GC/MS analyses all CCC compounds must have a %RSD of less than or equal to 30.0 percent. All VOA SPCC compounds must have a minimum average relative response factor (RRF) of 0.300 (0.250 for Bromoform). All semivolatile (BNA) SPCC compounds must have a minimum average relative response factor (RRF) of 0.050.

G. CONTINUING CALIBRATION DATA (FORM VIIA-ORGANIC):

The Continuing Calibration Data Form is used to report the verification of the calibration of the analytical system by the analysis of specific calibration standards. A Continuing Calibration Data Form is required for each twelve (12) hour time period for analyses.

For GC/MS analyses, after meeting specific criteria for both SPCC and CCC compounds, a Continuing Calibration Data Form must be completed and submitted.

Complete all header information. Using the appropriate Initial Calibration fill in the average relative response factor (RRF) or average calibration factor (CF) for all target and surrogate compounds.

Report the relative response factor (RRF) or calibration factor (CF) from the continuing calibration standard analysis. Calculate the Percent Difference (%D) for all compounds. For GC/MS CCC compounds analysis, ensure that the %D is less than or equal to 25.0 percent. After this criterion has been met, report the Percent Difference for all target and surrogate compounds.

H. INTERNAL STANDARD AREA SUMMARY (FORM VIII-ORGANIC):

This form is used to summarize the peak areas of the internal standards when required to be added samples, blanks, matrix spikes, and matrix spike duplicates. The data is used to determine when changes in internal standard responses will adversely affect quantification of target compounds. When internal standardization is used this form must be completed each time a continuing calibration is performed, or when samples are analyzed under the same GC\MS tune as an initial calibration.

Complete the header information. For GC/MS analyses, if samples are analyzed immediately following an initial calibration, before another GC/MS tune and a continuing calibration, Form VIII shall be completed on the basis of the internal standard areas of the 50 ug/L initial calibration standard for volatiles, and the 50 ng initial calibration standard for semivolatiles. Use the date and time of analysis of this standard in place of those of a continuing calibration standard.

From the results of the analysis of the continuing calibration standard, enter the area measured for each internal standard and its retention time under the appropriate column in the row labeled "12 HOUR STD". For each internal standard, calculate the upper limit as the area of the particular standard plus 100% of its area (i.e., two times the area in the 12 HOUR STD box), and the lower limit as the area of the internal standard minus 50% of its area (i.e., one half the area in the 12 HOUR STD box). Report these values in the boxes labeled "UPPER LIMIT" and "LOWER LIMIT" respectively.

For each sample, blank, matrix spike, and matrix spike duplicate analyzed under a given continuing calibration, enter the Sample Number and the area measured for each internal standard and its retention time. If the internal standard area is outside the upper or lower limits calculated above, flag that area with an asterisk (*). The asterisk must be placed in the far right hand space of the box for each internal standard area, directly under the "#" symbol.

Field Sample No.

IEPA LPC No.:	SITE NAME:
Lab Name:	Batch No.:
Matrix: (soil/water)	Lab Sample ID:
Analytical Method No.:	Lab File ID:
Extraction Procedure No.:	Date Received
% Moisture: (not dec.)	Date Extracted:
Dilution Factor:	Date Analyzed:
IEPA Pre-Notice Cleanup Program Data Quality Level IIIA \ IIIB (circle one)	

[illegible]

FORM II
IEPA PRE-NOTICE SITE CLEANUP PROGRAM
ORGANIC SURROGATE RECOVERY SHEET

IEPA LPC No.:	SITE NAME:
Lab Name:	Batch No.:
Matrix (soil/water)	Analytical Method No.:
IEPA Pre-Notice Cleanup Program Data Quality Level IIIA \ IIIB (circle one)	

	SAMPLE NO.	S1 () #	S2 () #	S3 () #	S4 () #	S5 () #	S6 () #	S7 () #	S8 () #	TOT OUT
01										
02										
03										
04										
05										
06										
07										
08										
09										
10										
11										
12										
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20										
21										
22										
23										
24										
25										
26										
27										
28										
29										
30										

Surrogate

QC Limits

S1 ()	=		
S2 ()	=		
S3 ()	=		
S4 ()	=		
S5 ()	=		
S6 ()	=		
S7 ()	=		
S8 ()	=		

FORM III
IEPA PRE-NOTICE SITE CLEANUP PROGRAM
ORGANIC MATRIX SPIKE / MATRIX SPIKE DUPLICATE RECOVERY SHEET

IEPA LPC No.:	SITE NAME:
Lab Name:	Batch No.:
Matrix (soil/water)	Analytical Method No.:
IEPA Pre-Notice Cleanup Program Data Quality Level IIIA \ IIIB (circle one)	

Compound	Spike Added (ug/L)	Sample Concentration (ug/L)	MS Concentration (ug/L)	MS % Recvry #	QC Limits % Recvry

Compound	Spike Added (ug/L)	MSD Concentration (ug/L)	MSD % Recvry	% RPD #	QC Limits	
					RPD	% Recvry

- # Column to be used to flag recovery and RPD values with an asterisk
- Values outside of QC limits

Comments: _____

FORM IV
IEPA PRE-NOTICE CLEANUP PROGRAM
ORGANIC METHOD BLANK SUMMARY SHEET

IEPA LPC No.:	SITE NAME:
Lab Name:	Batch No.:
Matrix (soil/water)	Lab Sample ID:
Analytical Method No.:	Date Extracted:
Extraction Procedure No.:	Date Analyzed:
	Time Analyzed:
IEPA Pre-Notice Cleanup Program Data Quality Level IIIA \ IIIB (circle one)	

THIS METHOD BLANK APPLIES TO THE FOLLOWING SAMPLES, MS AND MSD:

	Lab Sample ID:	Lab File ID.	Time Analyzed
01			
02			
03			
04			
05			
06			
07			
08			
09			
10			
11			
12			
13			
14			
15			
16			
17			
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19			
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21			
22			
23			
24			
25			
26			
27			
28			
29			
30			

FORM VA
IEPA PRE-NOTICE CLEANUP PROGRAM
VOLATILE ORGANICS GC/MS INSTRUMENT PERFORMANCE CHECK
BROMOFLUOROBENZENE

IEPA LPC No.:	SITE NAME:
Lab Name:	Batch No.:
Lab File ID:	BFB Injection Date:
Instrument ID:	BFB Injection Time:
IEPA Pre-Notice Cleanup Program Data Quality Level IIIA \ IIIB (circle one)	

m/e	Ion Abundance Criteria	% Relative Abundance
50	8.0 - 40.0 % of mass 95	
75	30.0 - 66.0 % of mass 95	
95	Base peak, 100 % relative abundance	
96	5.0 - 9.0 % of mass 95	
173	Less than 2.0 % of mass 174	() 1
174	50.0 - 120.0 of mass 95	
175	4.0 - 9.0 % of mass 174	() 1
176	93.0 - 101.0 % of mass 174	() 1
177	5.0 - 9.0 % of mass 176	() 2

1 - Value is % of mass 174

2-Value is % of mass 176

THIS CHECK APPLIES TO THE FOLLOWING SAMPLES, MS, MSD, BLANKS, AND STANDARDS:

	Lab Sample ID	Lab File ID	Date Analyzed	Time Analyzed
01				
02				
03				
04				
05				
06				
07				
08				
09				
10				
11				
12				
13				
14				
15				
16				
17				
18				
19				
20				
21				
22				

FORM VB
IEPA PRE-NOTICE CLEANUP PROGRAM
SEMIVOLATILE ORGANICS GC/MS INSTRUMENT PERFORMANCE CHECK
DECAFLUOROTRIPHENYLPHOSPHINE (DFTPP)

IEPA LPC No.:	SITE NAME:
Lab Name:	Batch No.:
Lab File ID:	BFB Injection Date:
Instrument ID:	BFB Injection Time:
IEPA Pre-Notice Cleanup Program Data Quality Level IIIA \ IIIB (circle one)	

m/e	Ion Abundance Criteria	% Relative Abundance
51	30.0 - 80.0 % of mass 198	
68	Less than 2.0 % of mass 69	() 1
69	Mass 69 relative abundance	
70	Less than 2.0 % of mass 69	() 1
127	25.0 - 75.0 % of mass 198	
197	less than 1.0 % of mass 198	
198	Base Peak 100 % relative abundance	
199	5.0 - 9.0 % of mass 198	
275	10.0 - 30.0 % of mass 198	
365	Greater than 0.75 % of mass 198	
441	Present, but less than mass 443	
442	40.0 - 110.0 % of mass 198	
443	15.0 - 24.0 % of mass 442	() 2

1-Value is % of mass 69

2-Value is % of mass 442

THIS CHECK APPLIES TO THE FOLLOWING SAMPLES, MS, MSD, BLANKS, AND STANDARDS:

	Lab Sample ID	Lab File ID	Date Analyzed	Time Analyzed
01				
02				
03				
04				
05				
06				
07				
08				
09				
10				
11				
12				
13				
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21				
22				

... FORM VIA
IEPA PRE-NOTICE SITE CLEANUP PROGRAM
ORGANIC INITIAL CALIBRATION DATA
(USING RELATIVE RESPONSE FACTORS)

IEPA LPC No.:		SITE NAME	
Lab Name:		Batch No.:	
Analytical Method No.:		Calibration Date(s)	

[illegible]

SURROGATES

IEPA LPC No.:	SITE NAME	
Lab Name:	Batch No.:	
Analytical Method No.:	Calibration Date(s)	

SURROGATES

IEPA LPC No.:	SITE NAME	
Lab Name:	Batch No.:	
Analytical Method No.:	Calibration Date(s)	

Candidates			

FORM VIII
IEPA PRE-NOTICE SITE CLEANUP PROGRAM
INTERNAL STANDARD AREA SUMMARY DATA

IEPA LPC No.:	SITE NAME	
Lab Name:	Batch No.:	
Analytical Method No.:	Calibration Date(s)	

[illegible]

IS() = _____
IS() = _____
IS() = _____

Area Upper Limit = +100 % of internal standard area
Area Lower Limit = -50 % of internal standard area
RT Upper Limit = + 0.50 minutes of internal standard RT
RT Lower Limit = - 0.50 minutes of internal standard RT
Column used to flag values outside control limits with an asterisk
* Values outside control limits

Navistar International
Transportation Corp.

455 North Cityfront Plaza Drive
Chicago Illinois 60611
Telephone 312 836-2000

NAVISTAR.

June 13, 1996

Ms. Neelima V. Reddy
Project Manager, State Sites Unit
Remedial Project Management Section
Division of Remediation Management
Bureau of Land
Illinois Environmental Protection Agency
2200 Churchill Road
Springfield, IL 62794

Re: Former West Pullman Works
1015 West 120th Street Facility
Chicago, Illinois

Dear Ms. Reddy:

The purpose of this letter is to transmit to you three copies of the Draft Site Work Plan to address environmental issues at the above facility. Included in the Draft Site Work Plan are Field Data Forms, Site Site-Specific Quality Assurance Protocol and Site-Specific Quality Assurance Plan generally followed under the Illinois Pre-Notice Site Cleanup Program (Volume I of III). The Draft Health and Safety Plan (Volume II of III) and the Draft Community Relations Plan (Volume III of III), integral parts of the Site Work Plan, have been prepared as separate volumes.

These draft plans are submitted as part of the requirements of the Illinois Site Remediation Program, successor to the Pre-Notice Site Cleanup Program. As you know, the above facility is enrolled in the Illinois Site Remediation Program.

Please note that copies of these draft plans have been shared with the Better Living Foundation, current owner of the site.

Ms. Neelima V. Reddy

June 13, 1996

Please review these draft plans and provide me with your comments. We can then schedule a conference call or a meeting to discuss your comments and issue a set of final plans thereafter. If you have any questions, please call me at (312) 836-3051 (FAX - 312-836-2573) or our consultant, Marty Hamper of Geraghty & Miller at (312) 263-6703 (FAX - 312-263-7897).

Sincerely,



Edith M. Ardiente, P.E.
Director, Environmental Affairs

Enclosures (3)

cc: Mr. Rodger Field, U.S.EPA Region V (with enclosure)
Mr. Edward J. Hanlon, U.S.EPA Region V (with enclosure)
Ms. Noemi Emeric, U.S.EPA Region V (with enclosure)
Mr. Kevin Stanciel, City of Chicago (with enclosure)
Ms. Jeanette Zeldin, Navistar (with enclosure)
Mr. Cary Perlman, Latham and Watkins (with enclosure)
Mr. Langdon Neal, Atty. for Better Living Foundation
(with enclosure)
Mr. Dean P. Stanley, Navistar (with enclosure)
Mr. Marty Hamper, Geraghty & Miller